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## ORIGINAL ARTICLES

### CLINICAL OBSERVATIONS ON SUB-ACUTE BACTERIAL ENDOCARDITIS\*

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THE clinical diagnosis of subacute bacterial endocarditis in the absence of its usual signs and symptoms is often a difficult problem. The study of the cases at the Massachusetts General Hospital, which furnished the material for this paper, was undertaken with the hope that additional points in diagnosis might be disclosed which would serve to differentiate this disease from those with which it is often confused. As a rule, the conditions which simulate it are much less fatal and more amenable to treatment. The value of an accurate diagnosis from the prognostic as well as the therapeutic standpoint is obvious. A study of the incidence of the disease in this hospital has been made independently by Morrison (q. v.) and comprehensive statistical and historical surveys may be found in the literature<sup>1,2</sup>. Sixty-five consecutive case histories have been studied for the present paper, including the histories of 20 cases either observed or studied by the author. No claim for accuracy of observations or statistics is made, but the truth has been as nearly approached as is possible in the analysis of any series of case reports from a general hospital. The diagnosis in the cases herein reported was based on 24 autopsies and 39 positive blood cultures and clinical evidence herein discussed.

A discussion is made below of (1), respiratory signs and symptoms, (2), cardiac symptoms and signs, (3), abdominal pain and splenomegaly, (4), renal conditions, (5), symptoms and signs due to the involvement of the central nervous system, (6), blood findings, (7), pain in the extremities, (8), clubbing, (9), skin manifestations.

1. *Respiratory Signs and Symptoms:* Signs or symptoms referable to the respiratory tract occurred in over seventy-five per cent of the cases studied. In some instances they can be explained by infarction of the spleen with or without perisplenitis, giving lower chest pain especially on breathing; in others passive congestion from mitral stenosis or weakened myo-

cardium can have been the cause, while in a few cases pulmonary infarction or embolism was found. In some instances, long before death, pulmonary symptoms have been present which can not be explained by these factors alone.

Gross infarction was present in three of the necropsied cases herein reported. In two instances there was present a thrombus of the right auricle, and in the third, a thrombosis of the vena cava. Gross infarction of the lung in these cases had its origin on the right side of the heart. Gross pulmonary embolism was found in three cases, two of which showed endocarditis of the tricuspid valve and the third showed a thrombus in the right auricle. Libman<sup>3</sup> mentions two cases in which infarction of the lung took place, and states that material causing the infarction was the same as that found in the vegetations on the heart valves. In one case there was an open foramen ovale, and in the other there was a patent ductus arteriosus with vegetations on the wall of the pulmonary artery. These cases are cited to show that probably always gross pulmonary infarction in this disease, or even embolism, can be traced to the right side of the heart.

Since the majority of vegetations occur on the left side of the heart, there is yet another source of pulmonary complications in the disease under discussion. Miller<sup>4</sup> has pointed out the relation of the bronchial arteries to the bronchial tree and has indicated the possibility of infarction of these vessels. Certainly we have no record in this series of gross infarction via these vessels. The author wishes to propose the theory that there may be numerous emboli too small to produce gross infarction but large enough to plug up the smaller bronchial vessels and thereby set up sufficient local disturbance to give rise in part to the frequency of pulmonary signs or symptoms not explainable on any other basis.

Pulmonary tuberculosis, occasionally the preliminary diagnosis in this disease, can usually be ruled out by the X-ray picture, but clinically the presence of a rheumatic heart lesion should make one sceptical of this diagnosis. Chronic

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lung infections of unknown etiology, empyema, bronchiectasis and subphrenic abscess have occasionally been the preliminary diagnosis when the real lesion was endocarditis. Since clubbing of the fingers may occur in some of these, the case may be unusually misleading. An analysis of the incidence of clubbing revealed that it did not occur without a palpable spleen except in one case. The explanation of this probably lies in the fact that clubbing of the digits tends to be a later development than splenomegaly. This observation may be of value in differentiating endocarditis from a purely pulmonary condition.

2. *Cardiac Symptoms and Signs.* The heart usually shows some clinical evidence of organic or congenital valvular disease, but that this may not be present has been pointed out by Blumer<sup>2</sup>. This occurred in two cases in this group. Since the diagnosis of bacterial endocarditis rests essentially on the evidence of embolic manifestations, it is not surprising to have found that the diagnosis could have been made in all cases, if made at all antemortem, without examination of the heart. In other words, although positive heart findings are suggestive, the absence of evidence of valvular disease should not rule out the possibility of endocarditis being present.

Pain in the left or right shoulder occurred four times and precordial pain ten times. Libman<sup>3</sup> has pointed out that infarction of the spleen, with diaphragmatic irritation, may be responsible for this. The writer has been impressed with the frequency of aortic lesions when precordial pain has been complained of, and an analysis of the records showed this to have been true in nine of the ten cases.

Our records verify the belief of Libman that acute pericarditis is usually the result of either an infarction of the heart, a nearby pneumonic lesion, or in association with a terminal nephritis. Acute or chronic pericarditis was present in twenty-five per cent of the necropsied cases of the present series.

Electrocardiographic findings were recorded in a few instances. Normal rhythm was always present and the only occasional abnormalities were right axis deviation, low T-2 waves and a lengthening of the P-R interval. The pulse rate is of particular interest on account of what seems to be an accepted fact, namely, that endocarditis is always associated with an increased rate. Our records frequently show periods of several days and more of normal rate even in the presence of fever. It is obvious that such occurrences may lead to doubt in the diagnosis, or to false hopes of recovery.

3. *Abdominal Pain and Splenomegaly.* Abdominal pain occurred in seventeen per cent of the cases and was located in the upper quadrants. The possibility of an erroneous diagnosis is clear, especially when the pain is often

accompanied by fever, tenderness, muscle spasm and leukocytosis. Appendicitis, gall bladder, colic, or renal stone may be simulated. As the pain is usually the result of embolus, the characteristic feature is the abruptness of onset. Renal infarction is especially apt to produce severe pain.

A palpable spleen is an important and very frequent finding and may be present early in the disease. When other signs are not present, it may lead to confusion in diagnosis. Reference has previously been made to symptoms produced when infarction of this organ takes place.

4. *Renal Condition.* The lesion of the kidneys has been described by Baehr<sup>4</sup>. Glomerulonephritis was recorded in a third, and infarction in about one-half of the cases necropsied. In spite of this high incidence of renal involvement, observations on the renal function showed very little impairment. Of 26 cases so studied, only four showed an excretion of phenolsulphonthalein below 25 per cent in two hours and the same four cases were the only ones to reveal a blood non-protein nitrogen of over 40 mgms. per 100 c.c. The specific gravity of the urine varied normally. Blood, casts and albumin were present at one time or another in over two-thirds of the cases. Edema was recorded present in one-third of the cases, but it was not stated whether it was dependent or not. These findings agree with the statement of other observers that although the kidneys usually show evidence of disease, the function as a rule is seldom reduced to the low level found in chronic glomerulonephritis, except as a terminal event.

Hypertension of the magnitude found in chronic glomerulonephritis is seldom present in bacterial endocarditis. In only one case was there a systolic blood pressure of over two hundred with a diastolic pressure of over one hundred. In all other cases in which there was a systolic pressure of over one hundred and fifty there was present an aortic regurgitation and a low diastolic pressure.

Valvular lesions are not uncommon in chronic glomerulonephritis, presenting the usual picture of anemia, hypertension, low renal function and elevated non-protein nitrogen. This is apt to be true especially in those cases that present a past history of repeated attacks of tonsillitis. These cases have always shown negative blood cultures and have not developed other signs of bacterial endocarditis except in one case reported. This has been particularly notable in view of Libman's<sup>5</sup> description of the bacteria-free stage of this disease. Of seven cases which showed negative blood cultures and in which post-mortem examination revealed bacterial endocarditis, there was sufficient evidence present in all but two cases to have warranted a positive diagnosis of the latter disease antemortem. By "sufficient evidence" is meant fever, along with embolic manifestations, or the presence of

CASE NO.	DATE
40	5-29-25
40	5-29-25
40	7-2-25
12	7-14-24
18	8-24-24
32	4-4-23
48	11-6-22
48	1-24-25
28	10-21-25
6	10-2-21
53	8-11-21
53	8-25-21
5	8-2-21
37	1-10-18

TABLE I

CASE NO.	DATE	SITE	NEUR. SIGNS OR SYMPTOMS	CONDITION OF PATIENT	APPEARANCE OF FLUID	INITIAL PRESSURE	CELL COUNT	TYPE OF CELLS
40	8-20-25	Lumbar	Headache Ataxia Choked discs	Fasting	Xanthochromic	200mm H <sub>2</sub> O	79W.B.C. 100R.B.C.	Polys 59% Monos 41%
40	8-25-25	Rt. Ventricle	do	do	slightly blood tinged	295	70W.B.C. 3000R.B.C.	Polys 50% Monos 10%
40	7-2-25	Lumbar	do	Not fasting	clear	increased	1300W.B.C. 5R.B.C.	Polys 75% Monos 25%
12	7-15-21	Lumbar	Drowsiness Spastic gait Plus F.J.S.	Not fasting	slightly blood tinged	300	50,000R.B.C.	-
18	8-21-21	do	Blurring vision Unequal pupils	do	clear	72	14W.B.C.	Polys 16% Monos 84%
32	4-4-23	do	Kernigs sign	do	?	120	0	---
48	11-6-22	do	Hemiplegia	do	clear	?	0	-
48	1-24-25	do	Hemiplegia Ataxia Agrophia Acholia	do	clear	180	0	-
28	10-21-25	do	Cranial Nerve Palsy	do	clear	140	8W.B.C.	-
6	10-2-21	do	Choked discs Facial paralysis Kernigs sign	do	clear	170	860W.B.C.	Polys 70% Monos 30%
53	8-11-21	do	Facial paralysis	do	clear	145	27W.B.C.	Polys 95% Monos 5%
53	8-25-21	do	do	do	Xanthochromic	110	500W.B.C.	Polys 90% Monos 10%
5	8-6-21	do	Hemiplegia	do	Turbid	?	520W.B.C.	Polys 60% Monos 20%
37	1-10-18	do	Paralysis External rectus	do	clear	60	24B.C.	



TYPE OF CELLS	TOTAL PRO- TEIN mgns/100cc.	NON-PROTEIN NITROGEN mgns/100cc.	SUGAR mgns/100cc.	Chlorides as NaCl mgns/100cc.	WILD SOLARACTIVES	MOUSE	DOG	CAT
Polys 59% Monos 41%	27	15	56 Blood plas- ma 111	661 Blood plasma 565	000012100	0	No organisms	do
Polys 90% Monos 10%	114	-	57	386	000002210	0	do	do
Polys 76% Monos 25%	114		23	622	1122245422	0	No organisms	do
-	63		50		1124621000	0	-	do
Polys 16% Monos 84%	49	14 Blood Plas- ma 30			0000000000	0	No organisms	do
---	21				0000000000	0	-	do
-	36				0012100000	0	-	do
-	33				0000000000	0	-	do
-	47				1111000000	0	-	do
Polys 70% Monos 30%	68		71		0011100000	0	No organisms	do
Polys 95% Monos 5%	Globulin=0				---	0	do	do
Polys 90% Monos 10%	Globulin=+				----	0	do	do
Polys 80% Monos 20%	Globulin=+				----	0	do	do
	Globulin=0				----	0	do	do

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macrophages in the blood with one or more of the suggestive signs of the disease, such as a valvular or congenital lesion, clubbing of the fingers, or splenomegaly. It would therefore seem that in most cases, at least in this series, there exists sufficient clinical evidence, whether the case be bacteria free or not, to differentiate between true chronic glomerulo-nephritis and the embolic nephritis of bacterial endocarditis.

5. *Symptoms and Signs due to Involvement of the Central Nervous System.* One of the most interesting phases of this disease is the complexity of neurological pictures it may present. The insidious onset of the disease explains why cerebral manifestation may be the first thing to be noticed by the patient and consequently mask the real trouble. Such clinical pictures as meningitis, brain abscess or tumor, with choked disks, or hemiplegia or other paralysis may present themselves. The spinal fluid findings and the chief neurological signs of the ten cases in which puncture was done are listed in Table I.

The most characteristic finding is that of a high white cell count with no organism or growth on culture. This finding would lead one at first to suspect infectious meningitis, were it not for the absence of organisms. This is in all probability the reaction to infarction, a sort of aseptic meningitis, the kind not infrequently associated with brain abscess. The low sugar and chloride content in case 40 may also be found with brain abscess or a general systemic infection.

TABLE II

VARIATION IN TOTAL LEUCOCYTE COUNT WHILE UNDER OBSERVATION

	Cases
Normal count throughout	5
Normal and leukocytosis	22
Normal plus leukocytosis and leukopenia	2
Normal and leukopenia	4
Leukocytosis throughout	24
Leukopenia and leukocytosis	6
	65
Total number showing leukocytosis at one time or another	54
Total number showing leukopenia at one time or another	14

6. *Blood Findings.* Our records show that the white count in this disease is apt to be extremely variable, and this fact may be of some diagnostic value. In Table II it may be seen that the majority of the cases at one time or another show a leukocytosis and that it is rare for a leukopenia to be present continuously. Table III illustrates another striking feature found in some of the cases, namely, the marked variation in number of white cells that may take place from day to day and the sudden appearance of macrophages. In two cases (Nos. 1 and 8)

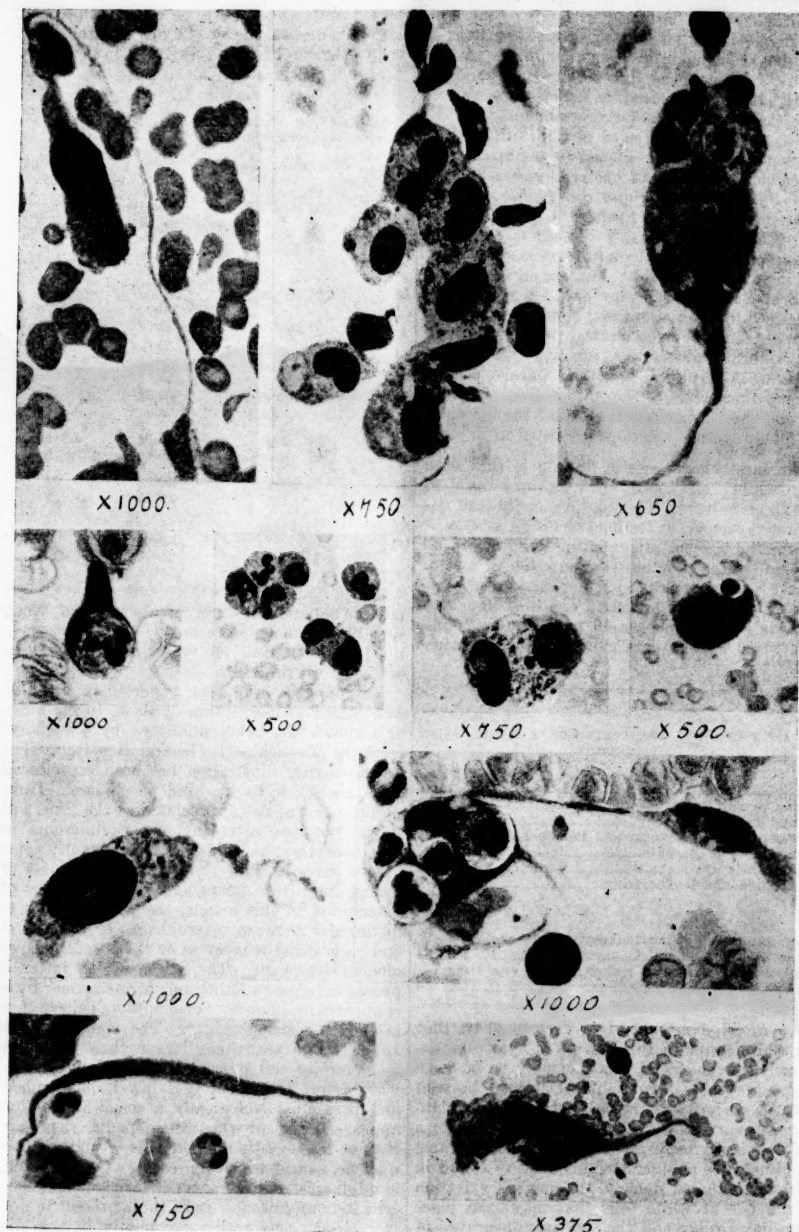
marked differences were noted in samples of blood taken simultaneously from different sites, such as the right ear and finger. These were re-

TABLE III  
VARIATION IN WHITE COUNT WITH PER CENT OF MACROPHAGES IN INDIVIDUAL CASES

Case No.	Maximum time interval	Variation	Per cent macrophages
14	24 hours	9000 to 85000	0
46	24 hours	4800 to 35000	0 to 24
53	24 hours	51000 to 24000	20 to 7
	48 hours	84000	Not recorded
64	24 hours	10000 to 20400	0 to 14
20	24 hours	13000 to 32000	0 to 14
52	60 hours	5000 to 52000	0 to 8
62	24 hours	94000 to 21000	14 to 2
39	24 hours	110000 to 50000	? to ?
	48 hours	44000 to 130000	Many to ?

peated because an error was suspected when such discrepancies were noted, but the observations were verified. A recent article by Hess confirms this finding<sup>8</sup>.

Macrophages have been reported in this disease<sup>8</sup>, the first description of them, to the author's knowledge, being published by Van Nuys from the Massachusetts General Hospital<sup>9</sup>. The accompanying illustration has been reproduced from his article by his kind permission. Their significance was not appreciated at the time, but it was not long after that their occurrence in this disease was recognized. Consequently some of our records show that they were found or looked for fifteen years ago. For purposes of description in this article, the writer wishes to distinguish between macrophages or histiocytes and endothelial leukocytes or the so-called large mononuclear cells. The origin of the latter is presumably the endothelium; of the former little is apparently known. Some authors believe they are of the same origin<sup>8,9</sup>. The macrophage is from two to ten times larger than the large mononuclear cell present in normal blood, and when found is present in fairly large numbers and presents histologically a somewhat similar appearance except when pseudopodia, vacuolization, or the ingestion of red cells or polymorphonuclear leukocytes are present. On the other hand, increases in numbers of large mononuclear cells indistinguishable from those present in normal blood occur rather frequently in this disease, but they may also be observed in the blood



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during other infections. Occasionally these large mononuclear cells may show vacuolization or, more rarely, an ingested red cell. These are then designated as endothelial phagocytes to distinguish them from the larger and more numerous macrocytes. Finding the former should be considered as important evidence in the diagnosis, although of less importance than the latter.

TABLE IV

Cells	Per cent of cases found
Macrophages	5
Large mononuclears with ingested red cell	10
Large mononuclear count of over 15% with no other change	10
Marked vacuolization usually with increase in number	13
Per cent recorded showing changes	38

Table IV shows the incidence of these cells as observed in this hospital. It should be stated that mention was made of search for them in only thirty-seven per cent of the records, but that it is the author's opinion based on personally observed cases and those reported in the literature<sup>7,10</sup>, that they may be found in well over fifty per cent of the cases if continued search be made. Joseph<sup>7</sup> reports finding them in seven out of eight cases and recommends rubbing the ear or finger before puncture and examining the first drop of blood. A recent publication on the histological study of these cells by Fontana is illustrated with many plates showing the many different forms which they may assume<sup>10</sup>.

In view of the above findings, the author feels that the following summarizes the value of these cells in the diagnosis of this disease. The presence of macrophages is pathognomonic of bacterial endocarditis, the findings of one or two large mononuclear cells with an ingested red cell is strong evidence of the disease, while the presence of an increase of large mononuclears with or without vacuolization is very suggestive and a frequent finding.

As to other blood changes, a secondary anemia, often severe, is usually present, the platelets are abundant, and there is seldom any alteration in the coagulation or bleeding time. There has been no case seen or recorded here in which primary anemia was suspected and could not be ruled out by the blood picture.

7. *Pain in Extremities.* Acute arthritis or painful joints occurred in thirty per cent of the cases. Whatever the etiological relation of this disease is to acute rheumatic fever, there is one striking difference and that is the response to intensive salicylate therapy. In fact, failure to bring about relief of symptoms with salicylates in acute arthritis associated with a rheumatic heart should lead one to suspect bacterial endocarditis.

8. *Clubbing.* The recognition of early clubbing of the fingers and toes is often quite puzzling and opinions are apt to disagree. To distinguish between clubbing in the early stages and naturally bulbous finger-tips, the author has found particularly helpful the presence of a rim of fine new pinkish skin around the margin of the nail. This, when associated with tenderness of the finger-tips or other evidence of the disease, is very suggestive.

9. *Skin Manifestations.* Petechiae are recorded as present in over fifty per cent of these cases. The term has been loosely applied to all types of small skin lesions appearing in this disease. Consequently, no accurate estimate is available of the numerous types which are described by others<sup>2,3</sup>. It would appear that until the nature of the various lesions, most of which have been considered embolic in origin, has been more firmly established pathologically, the diagnostic importance of some of them should be held somewhat in doubt. Lewis and Harmer<sup>11</sup> have shown that in this disease there is injury to the walls of the small blood vessels, and that petechiae may be easily produced by increasing venous pressure. This would seem to indicate that a good many lesions are purely purpuric and therefore not especially indicative of endocarditis. In cases personally observed, by far the most reliable sign has been the conjunctival lesion. In the author's opinion, these are embolic in origin and not petechial, as pigment has not been observed after the erythema has subsided. The next most reliable and consistent finding has been the small red or pinkish cutaneous macules, usually about 2 to 4 mm. in diameter. At first they may blanch on pressure; later, they may or may not leave a small area of fawn-colored pigmentation. They have been seen to occur most commonly on the inside of the palms, fingers, soles and toes. The author believes these to be probably embolic in origin. The Osler's nodes have been observed, but not so frequently as others have reported. Embolic plugs, or hemorrhages of the retinal vessels, are common. Other lesions designated as purpura, deep, tender erythematous nodules, and various skin rashes have been seen or recorded. It is felt, therefore, that unless Osler's nodes or conjunctival lesions are found, very little emphasis can be laid on other skin lesions as being indicative of subacute bacterial endocarditis.

## SUMMARY

1. Sixty-five cases of subacute bacterial endocarditis have been reviewed from the point of view of differential diagnosis.

2. A tentative explanation is offered for the frequency of some of the pulmonary signs and symptoms occurring in this disease by the lodgment of emboli in the nutrient bronchial arteries of the lungs. Gross infarction was traceable to the right heart.

3. The rarity of clubbing in this series, ex-



cepting congenital lesions, in the absence of a palpable spleen is offered as a differential diagnostic sign.

4. Precordial pain in this series was usually associated with an aortic lesion.

5. Normal rhythm was present in all cases. The presence of auricular fibrillation is against the diagnosis of this disease.

6. The clinical differentiation between chronic vascular nephritis and the embolic nephritis of subacute bacterial endocarditis is shown.

7. Ten cases showing central nervous system involvement along with the spinal fluid findings are reported. The most characteristic finding suggests the presence of an aseptic meningitis.

8. The variability of the white count is emphasized and the presence of macrophages or other cells of the reticulo-endothelial system are described and their importance designated.

9. The importance of cutaneous embolic phenomena and clubbing of the fingers in diagnosis is discussed.

10. The clinical diagnosis of this disease

rests essentially on embolic manifestations in the various parts of the body.

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### A STUDY OF THE INCIDENCE OF SUB-ACUTE BACTERIAL ENDOCARDITIS AT THE MASSACHUSETTS GENERAL HOSPITAL

BY HYMAN MORRISON, M.D.

THIS study summarizes the statistics of subacute bacterial endocarditis at the Massachusetts General Hospital from 1904 to 1926. It was prompted by what impressed me as an unusual number of cases of this serious disease in private practice and in the hospitals during the period of 1921-1923. The term "subacute bacterial endocarditis" had been introduced by Libman in 1910; still it was not employed commonly, at least here in Boston, until 1921. In 1910 there are found in the records of the Massachusetts General Hospital for the first time the terms "subacute infectious endocarditis" and "subacute endocarditis"; three years later the diagnosis "subacute endocarditis with streptococcus viridans" appears twice, and the following year once. Not until 1921 is subacute bacterial endocarditis mentioned as a diagnosis; since then, however, it has been used freely.

The clinical picture of this form of endocarditis was first clearly called to the attention of the profession by Osler in his Gulstonian Lecture in 1885 under the name of "malignant endocarditis." He mentions there, however, that Kirkes in 1852 was first actually to describe the disease. Since then it has called forth a considerable literature under a multiplicity of names, but the most noteworthy studies have been contributed by Libman and his co-workers.

Libman classifies endocarditis as rheumatic, bacterial, syphilitic, and indeterminate. The bacterial group, so designated because these cases are due to known bacteria, he subdivides

into acute and subacute. The cases which run an acute course, lasting up to about six weeks, are due most commonly to the hemolytic streptococcus, the pneumococcus, and the staphylococcus, and originate in relation to some known septic condition. In the subacute group, lasting from four to eighteen months, or more, about 95 per cent of the cases are due to the non-hemolytic streptococcus, or the streptococcus viridans. Rarely the influenza bacillus is found, or the hemolytic streptococcus.

This type of endocarditis almost always occurs in individuals with previously damaged valves, generally of rheumatic origin, though it may at times be seen in defective valves of arteriosclerotic, of luetic, or of congenital origin. The left side of the heart is involved in the majority of cases. The lesions are broad wart-like vegetations, often extending up onto the mural endocardium of the left auricle and down onto the chorda-tendineae. They are very friable and consist of agglutinated masses of blood platelets in which there is an active growth of large numbers of streptococci. The protracted course of the disease is explained by the steady discharge into the blood stream of emboli containing bacteria of a rather low virulence from these friable vegetations.

The clinical course of subacute bacterial endocarditis is primarily that of a low grade sepsis modified ultimately by a variety of signs and symptoms due to embolism. The onset is almost always insidious with general malaise; as the

patient generally is known to have chronic valvular disease, due attention is not paid to it for a while. Not infrequently there is a mild joint pain, with or without swelling. There is pallor almost from the beginning, with progressive loss of strength and weight. In a good number of the cases there is clubbing of the fingers and splenomegaly. The pulse is rapid from the first and dyspnoea is a common feature. The fever is rather low at the outset, but takes on the septic swing with chills and sweats as the embolic phenomena manifest themselves in the important organs.

These embolic phenomena show themselves as crops of petechiae in the skin or mucous membranes, or as tender cutaneous nodules especially at the tips of the fingers or toes—the so-called Osler's nodules,—as infarctions in the spleen, the kidneys, and the lungs, as cerebral embolism and as embolic glomerulo-nephritis; rarely there may be embolic aseptic meningitis. The leucocyte count is usually said to be low, but may rise to a high level with the more severe embolic lesions. There is a progressive secondary anemia. The urine almost always shows red blood corpuscles; with renal infarction there may be gross hematuria; and with embolic glomerulonephritis there is a picture of acute nephritis. With the latter there may be edema and uraemia.

The signs in the heart generally do not change strikingly, unless new valves are attacked, and Libman has emphasized to almost diagnostic significance, that pericarditis does not accompany this type of endocarditis.

The diagnosis is confirmed by the finding of the streptococcus viridans in the blood. Not infrequently, however, the disease passes through a bacteria-free stage in which the organisms cannot be demonstrated in the blood.

Death is generally due to sepsis. Cardiac congestive failure and embolism are frequently contributing causes; and occasionally pneumonia or uraemia.

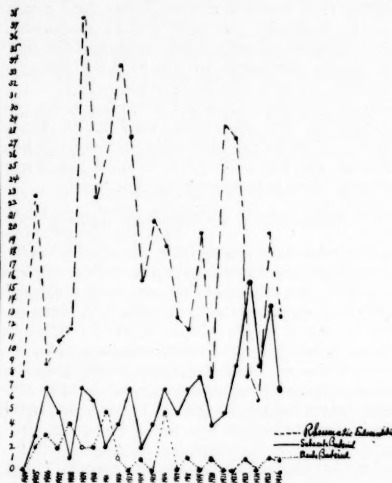
#### INCIDENCE OF ENDOCARDITIS AT THE MASSACHUSETTS GENERAL HOSPITAL (1904-1926)

Between 1904 and 1926 inclusive the records at the Massachusetts General Hospital show one hundred and forty-five cases of endocarditis that may be classified in the subacute and twenty-six cases in the acute bacterial group. During the same period there were four hundred and twenty-seven cases of acute rheumatic endocarditis.

The curves shown in plate herewith are the yearly incidence of the groups of cases. On the whole the curve for the subacute bacterial group has been fairly steady, except for the high peaks in 1923 and 1925, running from one or two to six or eight cases a year. There is no definite relationship between the curves of the different groups.

#### MORTALITY RATE OF THE THREE GROUPS

Of the four hundred and twenty-seven rheumatic cases only fifty-seven died at the Hospital, while all but one of the twenty-six acute bacterial cases and ninety-two of the hundred and for-



ty-five subacute cases died there. The others of the bacterial groups left with a hopeless prognosis and there are notes in the records indicating that at least sixteen died soon after.

#### AVERAGE STAY AT HOSPITAL

The average stay at the Hospital for the two bacterial groups was fifteen days. However, whereas the history in the acute cases runs back only a few days prior to their entrance and in direct relation to some acute infection of surgical procedure, in the subacute cases the history may date back as far as twelve months, at times. The longest single hospital residence in the whole group was three hundred and sixty days.

#### AGE AND SEX INCIDENCE IN SUBACUTE BACTERIAL ENDOCARDITIS

An analysis of the age and sex incidence in the subacute bacterial group shows that 57 per cent of the cases occurred in the second and third decades, and 74 per cent in the second, third, and fourth decades,—ninety-two among males and fifty-three among females. This indicates that the disease is nearly twice as frequent among males as among females, and that it is most common during the period of life when rheumatic fever is prevalent and in the decade following.

## MODE OF ONSET AND RELATION TO RHEUMATIC FEVER

In practically all the cases there is a history of insidious onset with weakness, shortness of breath, general malaise, mild fever and occasionally cough or gastro-intestinal disturbance dating from weeks to months before their coming to the Hospital. In only twenty instances is there mentioned acute joint trouble at the onset or during the course of the disease. There is, however, a past history of rheumatic fever in half of the cases. Chorea is recorded in the past history in five cases and tonsillitis in twelve cases. In ten of the cases tonsillectomy had been done at varying times prior to their last illness. Scarlet fever is mentioned in five cases.

## DISTRIBUTION OF VALVULAR LESIONS

The valvular lesions were distributed as follows: Both the mitral and aortic valves were involved in seventy-one cases; the mitral alone in fifty-two cases; the aortic alone in ten; the aortic, mitral and tricuspid valves in six cases. There were seven cases with congenital heart disease—pulmonic stenosis and patent ductus arteriosus. Arteriosclerosis is mentioned in four cases and luetic heart disease in three cases, while auricular fibrillation was noted but once.

## THE WASSERMANN REACTION

The Wassermann blood reaction is reported positive in seven cases. Three of these cases came to autopsy and showed no evidence of syphilis. Three cases with negative Wassermann reaction showed luetic infection clinically or by history.

## SPLENOMEGALY AND CLUBBING OF THE FINGERS

Splenomegaly is recorded in forty-six of the cases or in 36 per cent, not including enlargement due to passive congestion or infarction. The liver was palpable in sixteen cases. Clubbing of the fingers was recorded in twenty-eight cases. The age incidence in this last group was as follows: Two cases in the first decade; six in the second and eight in the third; and four and five respectively in the fourth and fifth decades.

## TEMPERATURE AND PULSE

As the cases seen in the Hospital were generally in the later stages of the disease, complicated by embolic processes, the temperature curve was usually of the septic remittent type ranging from 99 to 104, occasionally rising to 106°F. With the fever there were chills and sweating. The pulse range was between 100 and 140.

## THE BLOOD AND URINALYSIS

There was evidence of progressive anemia in all the cases. The haemoglobin readings ranged

from 90 to 35 per cent. The red cell count showed drops from four to one million and a half, or less. The leucocytes count was under five thousand in only 8 per cent of the cases, while it was over fifteen thousand in 44 per cent, and over thirty thousand in 21 per cent of the cases. Endothelial phagocytes were mentioned in five cases; it is only within the last few years these have been looked for. Urinalysis showed blood microscopically in 80 per cent of the cases, and albumin and casts alone or combined with blood in 44 per cent of the cases. Nephritis was mentioned in the diagnosis in twenty-two cases, or in eighteen per cent.

## BLOOD CULTURE

Blood culture examinations were made in one hundred and twenty-six of the subacute bacterial group. Forty-three showed no growth. It may be of historical interest to follow the nomenclature of the organisms isolated. In 1909 three cultures showed the streptococcus and one the streptococcus rheumaticus. In 1910 two were reported showing the streptococcus of endocarditis and one each an atypical streptococcus, an atypical pneumococcus, and a streptococcus mucosus capsulatus. In 1911 one showed the organisms of endocarditis and one the organisms of malignant endocarditis; one a streptococcus pyogenes and another a strepto-pneumococcus. In 1912 one culture is reported as micrococcus rheumaticus. Between 1914 and 1922 the organisms are recorded as streptococcus viridans, and since then as the non-hemolytic streptococcus. In 1925 two cases showed streptococcus hemolyticus. Once in the whole series, in 1923, the influenza bacillus was found in a post-mortem blood culture. There is no record as to the number of colonies of the organisms.

## EMBOLISM

Embolic processes were noted in ninety-six of the cases or in seventy-seven per cent. The following table shows the relative frequency of the various manifestations of the embolism.

	Number of cases
<i>Petechiae</i> (Including emboli in the skin, mucous membranes and Osler's nodules) .....	72
Infarction of kidneys.....	41
Infarction of spleen.....	36
Infarction of liver.....	1
Infarction of lungs.....	17
Cerebral embolism (including one case of embolic meningitis).....	21
Embolism of the extremities.....	4

## THERAPEUTIC EFFORTS

From time to time during the twenty years special therapeutic measures have been tried,—all equally futile. The records up to 1915 mention attempts at treatment with antistreptococcus serum, and with stock and autogenous vac-

cine. Since then sodium cacodylate, gentian violet and mercurochrome have been used, and still more recently transfusion. There is no record of the use of immune serum.

#### CAUSES OF DEATH

Sepsis is probably the important factor in the cause of death in all these cases. Often, however, there are contributing causes. Heart failure and chronic passive congestion are mentioned in forty-three cases. Embolism, cerebral or pulmonary, is recorded in twenty-one cases, pneumonia in six, and uraemia twice. The absence of suppurating processes is a striking feature.

There were forty-five post-mortem examinations, but the lack of uniformity in designating the endocarditis was as evident in the post-mortem diagnosis as in the ante-mortem. In the former it was either acute, subacute or chronic malignant, septic, vegetative, ulcerative, verrucose, or polypous. In the latter it was acute or chronic malignant, acute subacute or chronic endocarditis with streptococcus septicaemia, ulcerative or vegetative, chronic infections, or subacute bacterial. In thirty-two of the forty-five post mortem examinations there was found evidence of old rheumatic endocarditis or pericarditis.

#### SUMMARY

1. There were one hundred and forty-five

cases of subacute bacterial endocarditis at the Massachusetts General Hospital from 1904 to 1926 inclusive.

2. The incidence of this disease at the Hospital has been from one or two to six or eight cases per year, except for the high peaks in 1923 and 1925 when there were sixteen and fourteen cases respectively.

3. In the large majority of the cases the valves of left side of the heart were involved. In seven cases there was evidence of congenital heart disease. Arteriosclerosis and lues were factors in but few of the cases. Acute pericarditis was not met at all, and cardiac arrhythmia (auricular fibrillation) was met in but one instance.

4. In eighty-four cases the blood culture examinations were positive; in forty-two cases there was no growth.

5. The clinical picture of the disease is one of sepsis protracted by the low virulence of the streptococcus and modified by varied embolic processes. The absence of suppuration was striking.

6. Ninety cases died at the Hospital; the rest left in a critical condition.

7. Forty-two cases came to necropsy; in thirty-five of these there was evidence of old rheumatic infection.

8. All therapeutic effort has thus far been futile. The only preventive measure lies along the line of prevention of rheumatic fever.

## TUBERCULOUS INFECTION WITH ESPECIAL CONSIDERATION OF ITS QUANTITY, VIRULENCE, AND FREQUENCY\*

BY EDWARD R. BALDWIN, M.D.

It will appear superfluous, I am sure, to many of those present for me to bring forward a subject for consideration that has had fifty years of observation and experiment to confirm its main truths. My reason for offering these remarks is that, in the face of abundant knowledge and public education on the prevention of tuberculous infection, we have only begun to reach the goal of suppressing it in the home. The institutions function very well in keeping up fair standards of hygiene, but large groups of people (and among them physicians and nurses) neither practice nor teach an adequate sputum hygiene. Thus the family continues to furnish its successive crops of infected children for the following generation, and we fail to cut the chain that drags tuberculosis along the years. I am well aware that the answer might be that ignorance and filth are not rooted out of the best of communities and that we must accept a minimum of its consequences in the form of tuberculosis along with delinquencies in other respects that are inherent in vicious living. Let us neverthe-

less be well informed on the subject and not neglect to place the emphasis on preventive measures, where it is most needed.

It has seemed to some writers that tuberculosis was receding in many places without special efforts to control infection, and that we are witnessing a biological change in the virulence of the bacillus, a sort of evolutionary cycle in its epidemiology comparable to the lowering mortality from smallpox which occurred during the last century following vaccination.

It would be interesting to discuss this point at length, but I venture to say that we are not in possession of sufficient evidence from the bacteriological standpoint to furnish support for this theory. There are strains of tubercle bacilli of low virulence and we are possibly encountering these more frequently; and yet they are rare compared with strains of full virulence.

There is the other point of view to be considered in viewing the lowered mortality figures and that is the gradual immunization of humankind by universal infection. There are indeed plausible arguments made in favor of letting

\*Read before the Trudeau Society of Boston, April 12, 1927.



Nature take its course. Such a philosophy may appeal to those who escape tuberculosis but finds little favor among its victims, especially those who cannot be classed as unfit to survive.

Therefore I take it as our axiom to proceed by all practicable means to lessen if not to eradicate the infection. The dictum voiced by Pasteur that it is within the power of man to rid the earth of bacterial diseases should be held fast even in tuberculosis.

The particular problems voiced in my title have seemed of such paramount importance that they apply to practically all the questions to be solved in our program for the prevention of infection. To review the vast amount of experimental work on tuberculous infection is a task in itself, and I cannot attempt to give more than a sketch for our purpose here.

The problem appeared simple at first and Koch himself considered it so. Only when investigators began to question the ways of transmission did it appear otherwise, and experiments covering every conceivable phase of the question were performed. Opinions based on these experiments have undergone changes, now stressing one and again another mode of infection.

Thus in the first decade following the discovery of the bacillus we recognized dust as the chief means of conveying infection. Then came moist droplets coughed into the air; then food or milk infection in infancy; now again a revival of the belief in dust as the chief agent of transmission.

The first demonstration by Cornet in 1889, of dust containing bacilli in the rooms of tuberculous persons, was readily accepted as a logical and satisfactory proof of the source of infection. When Flügge in 1897 raised the question of moist versus dry particles floating in the air surrounding the tuberculous cougher, a very elaborate series of tests was started in Breslau that continued for several years and, with interruptions, virtually up to the present time in Germany and France. The subject seems never to be exhausted since new phases are constantly found on which to base experiments. The points studied in recent years have more to do with our subject, namely, the amount, virulence and frequency of the infection. Little attention was given to these factors by Cornet and Koch, partly because it was assumed that infection meant disease, and that any material that would cause disease by inoculation into guinea-pigs should be regarded as dangerous for man.

It is to be remembered that before the era of the tubercle bacillus the inoculations of Villemin had proved the infection present in sputum; and that Tappeiner had tried to infect rabbits by causing patients to cough into a box, but had failed. Others, like Charrin, Korth and Cadéac, and Malet, showed that the expired air of the tuberculous was not infectious. Still

others (Celli and Guarnieri) could not cause infection by blowing on dried masses of sputum which were not ground into dust. Following Cornet's convincing demonstrations from 1886 to 1890 of the presence of tubercle bacilli in dust found in the near vicinity of patients there was, as stated before, a general acceptance of this theory of inhaled infection. Nearly all the institutions with proper control of their patients rested on the belief that by providing cuspidors and ordinary cleanliness, there was little else to be desired. Obvious danger from coughing did not receive recognition though the source of dry bacilli was realized as due in small part to accidental contamination of clothing and especially of handkerchiefs.

Then came Flügge in 1897, who questioned the importance of inhaled dust, the degree of dryness of the sputum sufficient to produce floating dust of a size small enough to inhale, its vitality after drying, and its relative importance compared to fine, moist droplets. From the many ingenious experiments that were instigated by Flügge we have a good illustration of the patience and tirelessness of German scientists.

From the year 1897 to the present time almost continuous work has been carried on in Europe—principally in Germany—relating to droplet and dust infection. Possibly too little attention has been given in this country to their work. It is of interest to mention that Dr. J. J. Curry<sup>1</sup> read a paper before the Suffolk District Medical Society on his experiments with twelve patients in the examination of droplets. When visiting Flügge's Institution in 1902, Dr. Bruno Heymann, who had done much of the work, exhibited to me many of his cabinets and the apparatus used for their coughing experiments, and on my return we attempted a few experiments at the Saranac Laboratory which hardly deserve mention here as they came to nothing.

Flügge and his pupils pretty well demonstrated the relatively greater possibilities of infection of animals by sprayed sputum as compared with dusted, dried sputum. At least many of their experiments appeared to prove that point, though we shall see that as a practical matter such conditions do not obtain with many patients as were assumed in the Flügge experiments. For example, the first evidence brought forward was obtained by placing a suspension of *B. prodigiosus* in the mouth, and agar plates situated in different parts of the room were found to collect the floating bacteria at varying distances. This occurred following coughing, sneezing and talking, during which time the fine spray was ejected. The colonies of *B. prodigiosus* were easily grown on the plates thus inoculated.

When sputum was coughed by patients into a box of guinea-pigs the infections were not so uniform and often failed. Calculations were made from very laborious counts of the sputum bacilli,



or carefully prepared suspensions were made from the weighed particles of culture.

In these various ways a series of conclusions was arrived at somewhat as follows:

1. Not all coughing patients expelled droplets alike and some ejected none containing bacilli.

2. At a distance up to 50 cm. many droplets could be caught on glass slides and shown by staining to contain bacilli. Beyond one and one-half meters none was demonstrated.

3. A person must remain 24 hours within one and one-half meters of a constant cougher in order to breathe enough air to take in an occasional microbe, since in aspirating ten cubic meters of air from the coughing chamber, only now and then could the experimenters show a positive result.

While not disputing dust infection, Flügge declared it important only where sputum in considerable quantities was dried and rubbed into dust by numerous people walking through passageways and when strong air currents prevailed; or in the dry sweeping of rooms and clothing. Handkerchiefs, he thought, did not materially add to the danger from dust when occasionally used to receive sputum. Confirmation of the danger from moist spray was obtained by subjecting guinea-pigs to actual conditions of hospital life. They were coughed upon at different distances while patients lay in bed; they were also kept in hospital wards for weeks, inhaling the air.

Thus came about a greater fear among physicians and nurses and we witnessed attempts to prevent the danger by wearing masks and by the use of glass plate screens between patients and physicians when the throat was to be examined. These were soon abandoned by most of those who tried them and Flügge himself found that simply by holding a handkerchief before the mouth of the patient the droplets were decreased by one-half.

From the logic of these facts the modern directions to patients include along with sputum disposal in a cuspidor the covering of the mouth with gauze, paper or cloth handkerchiefs.

Further studies were nevertheless needed to clear up some discrepancies, especially as it appeared impossible to conceive of anyone escaping serious infection who was constantly associated with open tuberculous coughers. Inquiries were made as to the incidence of tuberculous infection among sanatorium and hospital physicians and nurses, without revealing unquestioned instances traceable to such service. There have been some unreported ones, in all probability, but when compared with the personnel of general hospitals we can only be surprised at the small number in tuberculosis institutions.

The number published by Ziesché<sup>2</sup> in 1907 were quite instructive in this connection, because he examined the quantity of droplets expelled and

actually counted the various types as well as the stained bacilli in them. The mouth droplets, being mostly saliva, are smaller and contain no bacilli as a rule. The bronchial droplets contain cells and the bacilli. Among 30 patients whom he used for 62 tests only 12 or 40 per cent expelled droplets containing bacilli, though all had positive sputum. Repeated examinations of the same patients however raised the percentage to 78.9. The morning hours produced the largest number of bacilli when the cough was most productive. Again in the evening an increase was noted. Also the spring and fall months favored more catarrh than other seasons and thus increased the cough. The number of bacilli found in the droplets varied from 3 to 20,000, by actual count and estimates. If as the author suggests from experiments with guinea-pigs by Findel<sup>3</sup> and others, 400 bacilli must be breathed in by a man to cause infection, it appears unlikely that a transient exposure to a coughing patient constitutes any danger. In Ziesché's experiments only 9 among 52 tests produced in half an hour droplets containing 400 bacilli within 60 cm. distance. Furthermore the patients who coughed out the most droplets were frequently ambulant and not the weak, bed-ridden cases. Laryngeal tuberculosis with ulceration of the vocal cords preventing the closing of the glottis and expulsive efforts in coughing did not yield droplets. Similar but more exhaustive experiments were done by Hippke<sup>4</sup> in 1921 with the purpose of showing the actual danger from patients, as the animal experiments performed under artificial conditions had not proven so convincing when applied to patients. Hippke used a simple instrument like a folding pocket mirror arranged to hold 3 glass slides. Patients in three sanatoria and in three tuberculosis hospitals were made to hold this frame before their mouths in coughing, about 25 to 30 cm. distant. Among 587 sanatorium patients there were only 43, or 7.3%, who were bacillus coughers in the preliminary test. When the coughing frame was exposed an hour daily for three days or more the percentage rose to 38—50. The method was advocated as simple and useful in determining which patients were potentially infectious during the act of coughing. It was found of practical importance that patients with moist catarrh expelled more bronchial droplets than others; dry irritant coughs yielded no droplets. The author sums up his findings as follows:

"I have the impression that among the patients as a whole only a small part, about one-quarter to one-eighth of all 'bacillus coughers,' are we forced to designate as dangerous; so that of the 20 to 40 per cent 'bacillus coughers' hardly more than 5 per cent of all the patients can be regarded as dangerous coughers."

It will be noted that within the last twenty years the emphasis on moist sprayed droplets has been lessened by such examinations as the

above and especially by the work of Chausse<sup>5</sup> in France in 1914 and 1916, and more recently by Bruno Lange<sup>6</sup> in the Koch Institute who re-examined the dried sputum question.

Köhlisch<sup>7</sup> had published in 1908 some elaborate experiments with dry bacilli in which quantitative estimates were made of the number inhaled by guinea-pigs. He concluded that in order to infect guinea-pigs by dried bacilli large numbers must be inhaled. Two thousand or more caused certain infection, since only 4 per cent of the bacilli were able to reach the smaller bronchi. So he concluded that at least 50,000 bacilli in room dust would be necessary to infect guinea-pigs, and possibly many more for man. Such numbers would not be present ordinarily, and the sputum in rooms and on handkerchiefs was rarely dried enough for dust. Therefore he minimized this danger. However, renewed attention to dried sputum was given by the discovery of Calmette, Guérin and Grysez<sup>8</sup> that infection of small animals was readily produced by way of the conjunctiva, an opinion confirmed by Lange<sup>9</sup>, who used very minute doses. The latter found in 1924 that besides the eye, the nose, mouth and digestive tract could be infected with very few bacilli. Thus the importance of contact infection with bacilli in dust or otherwise was again recognized. New experiments were done with dust and spray which led to the opinion that few droplets larger than 20 microns in diameter could be inhaled beyond the nose. Moreover, previous experimenters as well had found the droplets mostly 100 microns or larger and that the small ones were mostly free from bacilli. Lange also found by spraying into tortuous glass tubes that only droplets under 100 microns would go through. Within a year Lange has repeated some of Cornet's and Chausse's old experiments with dusty carpets, dry handkerchiefs, clothing, etc., with positive results, and he declared that dust infection is of great importance, though he does not deny the occasional existence of conditions favoring droplet infection. These are admittedly not rare in close quarters among the poorer people. Lange proved that many of the fine droplets dried quickly and easily flew off from handkerchiefs, clothing, etc., which fact had not received sufficient notice in Flüge's former experiments.

I have only reviewed a few of the points touched upon in these experiments, but you can realize that so far as proof of inhalation is concerned, we are at present confronted by the two possible sources of equal or unequal dangers; only by studying the individual patient can theoretically the relative danger from moist droplets or dried droplets be determined. Fortunately it will make no special difference with the means employed to prevent infection except that more attention is demanded to the dust problem.

I will now refer to the matter of food infection, and but briefly.

It was Findel's<sup>10</sup> work in 1907 that is often quoted to show that the experimental proof is overwhelming of the relatively less danger of feeding bacilli as compared with inhaling them. He found, for example, that a certainly fatal dose for guinea-pigs by inhalation was 20 tubercle bacilli, whereas it required at least 19,000 to 382,000 by feeding them. Such results cannot solely be depended upon in considering the danger to human beings, for in young infants it may well be otherwise. However, feeding infection is justly regarded as of secondary importance to inhaled infection, although we recognize a possible simultaneous infection of lungs and intestines which complicates observations on natural infection. The former conditions in handling food undoubtedly favored much contamination from human sources such as in bread, fruit and confectionery. Of course unregulated milk supplies are still numerous. The small town dairyman or the private one-cow dairy is hard to control, but the larger cities have measurably reduced the incidence of bovine infection by pasteurization and tuberculin testing of herds.

The amount of direct contact infection through the nose, mouth, tonsils and skin is undoubtedly large among children. Gross contamination is often present on the hands of patients who unwittingly fondle infants and children or give them food.

My own experiments<sup>11</sup> in 1898 showed a great frequency of tubercle bacilli on the hands of those patients who expectorated into handkerchiefs. Similar results have been obtained by others.

The tremendous importance of easy contact and almost certain infection in the home is well illustrated also by the fact that eating utensils must often harbor tubercle bacilli. These were the subject of study both by Dr. J. Woods Price<sup>12</sup> at the Saranac Laboratory and by Drs. Floyd and Frothingham<sup>13</sup> in Boston. Unwashed utensils readily betrayed infection possibilities on inoculation of guinea-pigs.

On the other hand, we must meet the question of the relative importance of slight infection thus acquired in human beings. From a study of latent lymphatic tuberculosis, especially of the cervical chain, there is much likelihood that children get slight infections by mouth as well as by nose. How much may enter by way of the conjunctiva and nasal duct is problematical. Dirt in every form may mean bacillary contamination in the homes of the tuberculous, but as to the number of the tubercle bacilli, we may be assured that they are few and therefore a slowly developing and usually a healing infection results.

This question of dosage is much discussed at the present time and it has been customary to employ the term "massive" in describing the

possibilities of gross infection. I believe the term rarely applies, for in all attempts to find bacilli in the nasal passages of physicians and nurses under exposure, but few bacilli have been demonstrated. For illustration, Straus<sup>14</sup> found them in only 9 out of 29 hospital nurses and interns. A. Moeller<sup>15</sup> after two and a half hours office examinations found bacilli three times in his nostrils but on 72 occasions none. In one test he found one bacillus on one examination, 4 in a second, and a clump of 6 in a third. These observations were made in tuberculosis institutions. LeNoir and Camus<sup>16</sup> found them in another experiment only exceptionally.

Another evidence of the small doses actually inhaled is the fact that in the nontuberculous bronchitic repeated sputum examinations are negative though the patient may be exposed to inhalations of dust in hospitals or sanatoria where tuberculosis is treated. Still another reason for believing that small amounts are not sufficient to infect seriously is the slow development of tuberculin sensitiveness in children known to have been negative before a definite exposure caused infection. Hamburger<sup>17</sup> has reported several cases from the Vienna children's hospital and altogether 22 are reviewed by Breckoff<sup>18</sup>. Among these nurslings and young children, exposed to a known source of infection, whom Breckoff studied, the inoculation period before the positive tuberculin reaction appeared, varied from 8 to 12 weeks. The maximum was 13 weeks and the minimum 10 days. A large number of observations are needed to determine the average "pre-allergic" period, as the French authors call it. The few that have been made indicate that small infections are the rule and that they are not all primarily pulmonary. Aside from the tuberculin test there is no way of determining the presence of these earliest infections, and when the x-ray shows tracheobronchial disease or a "primary complex" in the pulmonary area, the chances are that simultaneously, or even before, there was some involvement of the lymph structures in the upper air passages, especially the adenoid tissue of the posterior nares or faucial tonsils.

The relatively harmless infections in childhood are surely frequent and cannot be regarded as "massive" infections, judging from the course of the really acute diseases produced in exceptional cases of exposure like that of an infant nursed by a tuberculous mother.

The rôle of the numerous indirect ways of conveying infection, such as telephones, books, doorknobs, etc., also appears from experiments to be insignificant. That of flies and pet dogs is probably more important. It will be recalled that Dr. F. T. Lord<sup>19</sup> of Boston and Dr. L. Brown<sup>20</sup> and associates at Trudeau Sanatorium published some experiments with positive results from flies fed on sputum.

This source of danger is also lessened by the modern sanitary control of markets as well as by the emancipation of the horse, which has driven the English sparrow to adopt country life.

A few words may be said about inoculation tuberculosis. The external skin infections are fairly rare, but infected wounds about the mouth and nose or abrasions of the mucosa are more commonly seen in the skin clinics, but it is not likely that many are primary infections. A peculiarity of some cases of lupus is the type of bacillus found in the lesions, which has been identified as a low virulent bovine by Griffith<sup>21</sup>. It is more probable that such cases are due to external inoculation and are not metastatic from internal foci.

These mysterious differences in virulence have baffled bacteriologists. Some have held that permanent changes in virulence do not occur in tubercle bacilli. When such have been suspected they explain it as due to a mixture of strains. This is at present a subject of paramount interest so far as all pathogenic organisms are concerned.

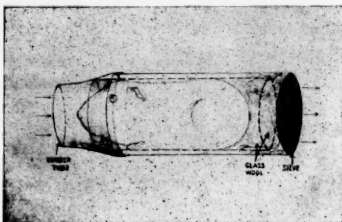
That temporary loss of virulence takes place is presumed, because with dried sputum large numbers of bacilli are required to infect guinea-pigs. The real explanation in this instance may be the death of most of the organisms, dried and exposed to light and air as they usually are. So it appears that the question of numbers and virulence is confused. A very slow infection can be produced by a few bacilli, even by one virulent bacillus. Likewise, a large inoculation of sputum dust may produce an equally slow infection.

The dried droplets are of special interest in these days of sputum disposal by means of cuspidors, which in the main, people undoubtedly use after a diagnosis is made. (Of course there are blots on the map where even the cuspidor is unknown!) But how much more can be accomplished than the destruction of sputum in bulk?

If moist droplets and dust from droplets are still the potent danger, we may require more than we are now doing to diminish infection both in the home and in the hospital. It was this question that led us lately to investigate the number and virulence of dried sputum particles deposited on bed jackets, pillows and bed spreads. Dr. J. Woods Price has thus far examined patients in hospital and private practice by a simple method of collecting the dust in a special vacuum cleaner. I cannot anticipate his results as the study is not completed, but from inoculations and stained specimens thus far examined only a small proportion show living, virulent bacilli. (Apparatus exhibited.) Of course these patients are in the open air during the day but much of their coughing is done indoors without in all cases direct sunlight in the rooms.

The conditions in many homes are quite favorable for sputum control but not for cough control, so we must accept the probability of some danger, to children at least.

These small numbers of dried bacilli, incapable apparently of producing clinical disease in most adults, nevertheless in children may have



Apparatus placed in vacuum cleaner to receive dust and infect guinea-pig by inhalation.

some influence when frequently repeated over long periods. The studies of family infection that have become more frequent since the vogue of health demonstrations, tuberculin surveys, and other welfare enterprises, reveal clinical disease in direct proportion to the amount of sputum and bacilli discharged and the length of exposure. The comparatively short duration of hospital or sanatorium residence for the majority of tuberculous parents has little effect in preventing infection among their younger children. It is merely an intermission that may, indeed, mean the difference between latent and manifest disease in a child but more often does not. We cannot be satisfied therefore with cuspidors alone in the home, though they suffice in sanatoria for adults. Complete control of cough being impossible, there is yet much more to do to prevent the ejection of spray by coughing, sneezing and other mouth movements. Much has been accomplished by simple education, but, as in hand-shaking, our social customs still impel us to commit errors which are frankly unsanitary.

With the great reduction of tuberculosis already accomplished by sustained effort, we have nevertheless not yet reached the individual in the home in an effective way, nor is there a prospect of such prolonged separation of parents from children even were that advisable. Hence, I would plead for that additional precaution in educating parents especially to become automatic in covering the mouth. We can also pay more attention to such matters as loud conversation, boisterous laughter and singing among the arrested tuberculous patients who are still carriers. Too often such patients assume to be discharged from sanitary control on return to their homes in good outward health.

When careful, intelligent effort is made, the facts of experiment support the belief that in-

fection of sufficient amount to cause disease can be obviated, and the parent who is vigilant and conscientious as well, can live with his family and friends without harming them. But granting such possibilities we well know such conditions are rarely achieved by even the elect and socially acceptable groups of enlightened persons.

Our teachable patients are only taught when they become as automatic as a good pianist. Moreover, this education needs to be begun in childhood like that of the accomplished musician. And then we know how many will fall short of good cough control even as many fall short of being good musicians. They always need their "notes" and the cougher someone to remind him of his omissions.

If we frankly accept the realities as they exist and the difficulties of inculcating new social customs, we shall cast about for other aids.

Special masks being impossible or impracticable, it occurred to me that for the purpose of impressing some difficult patients we might make a demonstration of their carelessness and potentialities for spraying droplets, by pinning a square of prepared sheeting on the bed covering in front of them. The cloth can be soaked in a 2% solution of ferrous chloride, dried and dusted with potassium ferrieyanide powder, the method used by Sieffert (shown in the screen). Coughed droplets are thus made visible because

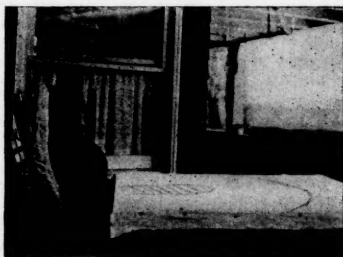


Diagram on a sheet showing the area covered by droplets after coughing.

blue dots form wherever moisture touches the prepared surface due to the Prussian Blue reaction. This gives visible evidence to the patient of his ability to spread infection. I have occasionally asked patients to cough against a hand mirror for the same purpose or requested them to cough across a sunbeam to visualize the spray.

Too often sentiments of delicacy or consideration for the feelings of a sensitive patient forbid direct mention to him of the danger to children or relatives; and reassurance is frequently required to avoid exaggeration of the danger. This, I believe, can honestly be coupled with such instructions as have been previously mentioned,



and the experimental proof of the absence of gross or massive infection when the decencies are complied with. More attention to the clothing and bedding may well be advocated to lessen the danger from dried droplets, however slight.

In institutions or nursing homes the use of the portable vacuum cleaner about the clothing before changing is a sensible precaution when children have access to the patient's room. More isolation in the home and more attractive institutional care remain for those who are without adequate means or ability to be sanitary.

We all realize what wide gaps exist between theory and practice and only by drastic methods of isolation could the offending coughers be made harmless. Society is under the necessity of paying a good price to be rid of the continued danger from infection, by concerted effort from many angles of attack.

My hope is that a few new thoughts have been put forward to help attack the problem for the individual. (Lantern slide exhibit of coughed spray, etc., was then shown.)

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#### DISCUSSION

DR. O. S. PETTINGILL, Middleton, Mass.: We have all listened to a conservative summary of the most recent experiments, as well as other evidence in connection with this form of contagion. I would like to present our experiences at the Essex Sanatorium with the incidence of tuberculosis among our supposedly healthy employees.

Our daily average number of employees is about 110. During the past six years four of our employees have developed a clinical pulmonary tuberculosis. Of these, one was a nurse who had a family history of tuberculosis and the appearance of clinical tuberculosis was preceded by a serious illness. One, a female attendant, gave a history of suspicious symptoms before she became an employee. Another, a janitor, who developed tuberculosis after about a

month's residence. The fourth, a maid who was the wife of a patient who had positive sputum, developed pleurisy with effusion.

At the Danvers State Hospital, situated about a mile from this sanatorium, they have reported that ten of their employees have developed clinical pulmonary tuberculosis within the last two years. They have a daily average of 340 employees. Not all of these, however, were definitely tuberculous although there were none of them but who could be classed as suspicious. Six of these were female attendants, one a male attendant, one a physician, one a telephone operator and one a kitchen helper. The period of employment averaged about one year. None of these persons had worked on the ward where tuberculous patients were domiciled.

It seems to us that we can rule out the infection taking place at the sanatorium in the four employees who developed the disease while at the sanatorium. This history of our employees is reassuring to us. I simply present this contrast between the two institutions realizing that it does not prove anything but is simply of interest to us.

DR. H. D. CHADWICK, Westfield, Mass.: The only thing that I can add to this discussion is a word about the result of some work we have done with tuberculin tests in our underweight clinics and in comparing the results of Von Pirquet tests this year with what Dr. Bartlett did ten years ago in Framingham. We recently tested 520 children in Framingham, which compares in number very well with the 460 done by Dr. Bartlett. He used the same technique for the tuberculin test and the tuberculin was obtained from the same source as in our tests. He found that 33 percent of the children from one to seven years of age reacted to the test. We found that 25.5 percent of the children from 3 to 15 reacted to this test. The number of children we tested under seven was about 60. In this small group, between 4 and 5 years of age, we found 14 percent reactors; he found 27 percent. In the group from 6 to 7 years of age we found 14.2 percent, and he found 54 percent reactors. It is important to know how many are known contacts. As far as I have been able to find, there is nothing in his report showing the number of contacts. In our group there were ten percent known contacts and that ten percent showed 50 percent reactors as compared with 22 percent reactors for the non-contacts. His percentage was 32 for boys and 35 percent for girls. Ours was 28.1 for boys and 24 for girls. In the non-contact group there was about the same difference—25.8 and 21.2.

DR. VINCENT Y. BOWDITCH, Boston: Mr. President, Ladies and Gentlemen. It would seem almost an impertinence to invite a gentleman to make an address and then to have it discussed by his hosts, but inasmuch as Dr. Baldwin has



been gracious enough to say he would be glad to have such discussion, I venture to speak of certain portions of his address which do not touch upon the strictly bacteriological and chemical researches in which he stands preëminent. I am impressed with what I may call the conservative-progressive attitude of Dr. Baldwin in his address in regard to our knowledge of tuberculosis and of our acceptance of the many theoretical and practical ideas which are continually offered in meeting the so-called tuberculosis problem. By this I mean that it is such a common thing to see a tendency, not confined to our profession, to seize upon some new idea which may be advanced, to swallow it whole, as it were, as gospel truth, before sufficient evidence has been given of its absolute worth. Dr. Baldwin's remarks impress me as coming from one who, while holding an ever-receptive attitude of mind for any new theory, yet is unwilling to accept that idea as truth until it has been thoroughly tested and proven beyond a shadow of a doubt.

That was the marked characteristic of the great Pasteur, who, with his transcendent imagination, was yet continually clipping his wings, as it were, until he had positive truth of his conclusions before he gave his result to the world.

I had hoped that Dr. Baldwin perhaps would touch upon the question of liability of infection of one adult from another. I speak of this for, at one time when it became known that a large number of cases of tuberculosis could be traced back to infection in childhood, there was marked tendency to ascribe all active cases to that early source rather than to possible infection later in life from one adult to another. In consequence of this belief, there was for a time a tendency, which I am glad to say I believe is diminishing, to minimize the danger of adult infection where close contact exists. In my experience I have seen far too many cases crop up in one family successively not to make me believe that great care should be taken to minimize the danger of infection from too close contact. While deprecating any attitude of making the patient feel he or she is a great source of danger to others, there is a rational course of procedure which can accomplish the desired result without cruelty.

I trust that these brief remarks will not be misconstrued as showing any lack of appreciation of Dr. Baldwin's most interesting and instructive address.

DR. FREDERICK T. LORD, Boston: It is a privilege to listen to one so competent to speak on this subject as Dr. Baldwin. I am much interested in his evidence regarding the presence of tubercle bacilli in the neighborhood of patient's with the disease, and in the general trend of the discussion. It was said by Cornet that the consumptive was harmful only through bad habits and since his time the opinion has often been expressed that the instructed patient with open

tuberculosis is harmless, or practically harmless.

Investigation of groups of persons intimately exposed to the disease in members of the family, however, indicates that in children under such circumstances tuberculous infection occurs in a larger proportion than in a more random sample of the population at the corresponding age. Such investigation also shows that manifest and fatal forms of tuberculosis develop in a large proportion of children under four and especially under one year of age in consequence of exposure in the family.

The danger to adults in family exposure is much less serious, but, nevertheless, cannot be ignored. Investigation of the consorts of the tuberculous has proved the most valuable method of making the inquiry. The results are variable, but on the whole may be taken to show that the disease may be acquired by adults when the exposure is as intimate as in marriage to a consumptive. Ward, for example, found by examination both partners affected in 58 percent, while in a control group of contacts other than husband and wife, only 20 percent were tuberculous and among contacts of non-tuberculous patients only five percent were tuberculous. Perhaps the most conclusive evidence in this matter is offered by Weinberg, who found in about 4000 consorts of the tuberculous the mortality from tuberculosis about double that in the general population.

Such findings suggest that intimate exposure to open tuberculosis is not without danger and should at least stimulate us so to instruct our patients that bad habits may not be held responsible for infection of others.

DR. GEORGE H. BIGELOW, Boston: I apparently cannot talk anything but milk. But I am anxious to get Dr. Baldwin's opinion of the significance of milk in the spread of tuberculosis. In an effort to persuade our Legislature we have run into all sorts of difficulties and conflicting opinions. It has even been said that the small amount of tuberculosis in milk produced an immunizing dose and that infected milk was therefore almost desirable. We estimated that a million and a half people are exposed to raw milk from untested cows daily.

A discouraging feature was that the other day a letter was read in the House from Dr. Theobald Smith in which the impression was given that the human disease aspect of the question was certainly not of first importance and that the economic aspect to the farmer outweighed the human. Sometimes I feel that one of the greatest drawbacks in getting any popular acceptance of a particular project is conflict among people who know the most about it. With the amount of vagueness in the cancer program which the Legislature has forced upon us I have felt that in our non-tuberculous milk program

we had something simple and concrete. The further I go into it the more conflicts I run into and the more its consistency becomes that of a jelly fish.

DR. EDWARD R. BALDWIN, Saranac Lake, N. Y. (closing): I appreciate all the kind remarks the gentlemen have made. The subject seems so trite it would hardly need to be reiterated. But at the same time there is so much infection yet, and there are so many people who are decent citizens who infract the laws of hygiene that we have to remind ourselves and the rest of us that we need sputum hygiene.

The question of milk has been raised, and it is certainly a confusing one at the present time. Dr. Chadwick mentioned it, and Dr. Bigelow referred to the attitude of Dr. Theobald Smith. It is difficult for me, and disturbing, to know what to say in answer. The question of milk control today is like the question of controlling any widespread infection; and some have the philosophy of doing nothing and letting Nature remove the unfit as she has removed the yellow fever susceptibles from the negroes in the South.

Now, my knowledge on milk infection is based mostly on reading and experiment, but as long as we have the possibility of making milk safe for babies, there is no excuse for not doing it. Yet I can see that the execution of the law may raise economic questions which would make it a slow process. For instance, in New York State there is a large group of intelligent dairymen who are in favor of the accredited herd system of testing cattle inaugurated by the United States Government,—making all certified dairies so that they can be regarded as free from infection. If Dr. Theobald Smith thinks it is unimportant, Dr. Veranus Moore of Cornell, who is an authority on cows, is decidedly against the accredited herd system as a practical measure; and yet he hasn't a good argument, in my opinion. I had a long talk with him last spring, and he thought it was a delusion that these cattle were free from tuberculosis in herds accredited by the United States Government. He thought that the farmers would be in danger of getting a case of tuberculosis every time they bought a new cow. If the dairyman cannot afford to kill his cattle for the small indemnity that the State pays, the next thing is to use pasteurization, and the prejudice against pasteurization has been less-

ened. Dr. Park believes that the bovine infections have diminished in New York City. A prominent pediatricist was opposed to pasteurization for years, but Nathan Straus finally succeeded in having it adopted. If the economic side of it is presented, tuberculin tests can be neglected in many cases and physical examination of cows depended upon. Yet if you have babies, I wouldn't advocate feeding them tuberculous cows' milk whether pasteurized or not. Bovine tuberculosis in infants is a real disease, as we know, and tuberculous meningitis has diminished in New York City since the adoption of pasteurization. The statisticians have brought that out.

The question whether it is practical to get tuberculin tested cattle plus pasteurization to an effective point is a question which I am not competent to answer. I do feel that we should not relax efforts, and that we should persuade legislators to do all they can with small appropriations to improve matters. The County of Cataugaus in New York has tested all the cattle in the County, and it is costing them a great deal of money to eliminate tuberculous cattle, but they have grasped the problem with a great deal of vigor, and I believe it is going through. I don't know, however, whether it will last. But the milk question is still important inasmuch as 25 percent of the infections of young children in England have been proven to be from bovine tuberculosis; and a large percentage in every country where the raw milk used is of bovine origin.

The idea of vaccinating babies against bovine tuberculosis is the same thing as inoculating smallpox. It is on a par with variolation against smallpox, that is, if you wish your children to be vaccinated against tuberculosis, you will be in the same position as when actual inoculation of smallpox was done in the nineteenth century. It seems like going backward. It seems to me to offer no advantage as a preventive measure as compared with these protective measures against infection.

If I have made any contribution, it is to revive the idea that dust is dangerous and that coughing is dangerous and that both should be suppressed in every possible way.

Further discussion by Dr. Cleaveland Floyd and Dr. John B. Hawes, 2nd.

## CANCER OF THE BREAST\*

BY ERNEST M. DALAND, M.D., F.A.C.S.

CANCER of the breast, if treated early, offers a good chance of cure. At present the death rate is very high, due in part to the fact that treatment is not being instituted early, and in part to its inadequacy when given.

\*Read before the Middlesex East Medical Society, Boston, January 12, 1927.

Cancer of the breast may occur at any age over 25. In general, the younger the patient, the more fatal the prognosis. The average age of onset is about 50. The greatest number of cases occurs between 45 and 55. This condition may be present in males, but these make up less than one per cent of all cases. Cancer is no

more frequent in married or parous than in single women, although in some instances we are able to trace some relationship to previous abscess or abnormal lactation.

Delay before consultation with a physician is a very serious factor. Emphasis must be laid on teaching patients to seek medical attention early, and on the fact that pain is not present in the incipient stage. Physicians should be urged to consider every breast tumor malignant until proved otherwise. This does not mean that operation on every tumor is advised, however.

At the Massachusetts General Hospital 176 cases of cancer of the breast were studied by Dr. Simmons and the writer<sup>1</sup>. The average duration on entrance to the hospital was nearly a year. In those cases on whom we had data there was a delay of 8.3 months before the first visit to the physician, a further delay of one month while under observation, and but two weeks' delay after operation was advised. As a rule, the disease was far enough advanced at the time of the first visit to allow the patients to make their own diagnosis.

With a patient complaining of a lump in her breast, there are certain essential points to be brought out in the history, such as the duration of the tumor, pregnancies, lactation, pain, relation to menstruation, and history of trauma.

The patient's clothes should be removed to the waist, and she should be examined at first sitting up and then lying down. Inspection will reveal any difference in the size of the breasts, ulcerations or swellings, inversion of the nipple, or puckering of the skin. The two breasts should then be palpated against the chest wall but not between the fingers. The breast in question should be lifted gently to note whether there is any tendency of the overlying skin to drag. Presence of dragging is usually a positive sign of cancer, although it does rarely occur with an adenofibroma. A tender tumor without skin adherence is more likely to be a cyst or an abscess. Tenderness which is increased at the time of the catamenia is more suggestive of a cyst. Multiple tumors without skin adherence or glands are usually cystic. Unilateral retraction of the nipple, fixation of the breast to the chest wall, skin ulceration over the tumor or a puckering of the skin to resemble pigskin are all positive signs of malignancy. The consistence of the tumor should be observed, whether it is hard, fibrous, or soft and fluctuant. Cancer, as a rule, feels hard. Gentle pressure about the nipple will enable one to determine whether any fluid can be expressed. Manipulation must be gentle, for Tyzzer<sup>2</sup> has shown that massage of a tumor is certain to produce metastasis.

An examination of the glands should now be made. They should be sought in the lower axilla and at the apex of the axilla on both sides. Whether or not they are fixed should be noted.

Glands of the neck and supraclavicular regions should be palpated. The presence of hard glands in either of these situations above the clavicle is sufficient reason for advising against operation. Glands low down in the axilla, if not fixed, may be removed at operation while if they are higher up, the prognosis is not as good. Tumors of the opposite breast, if metastatic, are of course sufficient reason to advise against operation.

In many women there is a projection of breast tissue upward toward the axilla. Occasionally there is a separate accessory breast. Cancer may arise here without showing signs elsewhere. Enlargement of the liver, widening of the mediastinal dulness, and the presence of fluid in the chest should be taken into consideration. The possibility of bone metastasis should be ruled out by careful questioning as to pain or dysfunction. X-ray plates of the chest should be taken before operation.

In making the differential diagnosis, cystic disease may usually be ruled out by a history of pain at the time of menstruation and the multiplicity of tumors or of general cystic change in a fibrous breast. It is more likely to occur in single women between the ages of 30 and 45. If there is a solitary large cyst, the treatment consists of operative removal. If a positive diagnosis can be made, it is safe to keep the tumor under observation for a time. However, if there is a constant increase and decrease in size in various cysts in the same breast, it indicates an activity in the breast tissue, best treated by removal of the breast. If the cyst is near the nipple there may be a discharge of clear serum from the nipple. A bloody discharge usually indicates a papillary growth into the wall of a cyst,—the papillary cystadenoma. This calls for a breast amputation. It is not unusual for these tumors to change into cancer unless so treated.

In young women adenofibromata may develop any time after puberty. They may be single or multiple. It is difficult to diagnose between cysts and fibromata. Removal of the tumor is required.

Sarcoma of the breast is comparatively rare but does occur. Its growth is rapid but it does not involve glands. If there are no lung metastases, amputation of the breast together with the underlying fascia is all that is necessary. Axillary dissection or removal of the muscles is not required.

Low-grade abscesses of the breast may present a problem in diagnosis. The writer recently saw a cancer which developed at the site of an old breast abscess. This tumor was explored and then the radical operation was done.

Cancer developing in the pregnant breast may show no definite tumor but may manifest itself by a brawny induration. It grows very rapidly

and is almost always fatal, whatever the treatment.

Paget's disease is an ulcerated, indurated lesion due either to a rodent ulcer of the nipple with secondary invasion of the breast, or to a cancer developing deeper in the breast and extending out to the nipple. The treatment is that of cancer of the breast even though no tumor is palpable. To the patient, this may seem radical, but it is necessary.

#### TREATMENT

Radium is of no value in cancer of the breast as a primary method of treatment. If the case is not operable for one reason or another, X-ray therapy is better than radium. In recurrent nodules of cancer, radium is sometimes used to advantage, but often it fails in destroying the disease.

We do not believe that X-ray offers the same chance of cure as operative treatment. Breast cancers have apparently been cured by X-ray and many have been checked for a period of years. As a palliative measure in advanced growths or recurrent cancer it is of great value to be sure. The development of the high power X-ray machines has improved the treatment, but the results hoped for have not been attained.

Simple excision of a cancerous nodule in the breast is little short of criminal. Cutting into a tumor without proper measures for sealing off the lymphatics is sure to spread the disease. If a diagnosis cannot be made, as frequently is the case, we believe it justifiable to explore the tumor with a cautery, remove a section and have it examined *immediately* by a pathologist. On receiving his report, adequate operation can be performed immediately without letting the patient out of ether. Another method is to cut out a section of the tumor and immediately cover the exposed area with gauze soaked in formalin. Waiting a few days for a microscopic diagnosis, after removal of the tumor or a part of it, is not justifiable as cases treated in this way nearly all die from metastases.

Cancers selected for radical operation with expectation of cure should be free from supraclavicular glands, adherent axillary glands, bone, liver, mediastinal and chest metastases, and should be freely movable on the chest wall. Operation on cases in which any of these factors are present is not defensible.

The radical operation consists of removal of the breast, the fascia underlying the whole field of operation, the overlying skin, the portion of the pectoralis major muscle which is attached to the sternum and ribs, the pectoralis minor muscle and the contents of the axilla with the exception of the axillary vessels, the long thoracic nerve, and the subscapular nerve and vessels. The glands of the upper axilla are not exposed unless the muscles are divided, so that any oper-

ation is incomplete unless it includes the removal or division of the muscles. The fascia is removed because this contains lymphatics which drain into the liver and the other breast. All the skin over the breast must be removed. All that a surgeon can expect is to extirpate enough tissue to prevent a recurrence in the operative field. Internal metastases, if they occur, were probably present before operation but gave no signs at that time.

As tumors appear in various parts of the breast, any operative technique must depend on their location. The skin removal must be widest in the region of the tumor. The surgeon should remove as much as is necessary, not allowing the fear of being unable to close the wound to influence the extent of the operation, as skin grafts may be done later if necessary.

Many types of incisions have been used to remove the breast and approach the axilla. The Warren incision encircles the breast and extends out onto the arm. A large flap is made from the skin below the axilla and this flap is swung up to close the defect. The Halsted incision is an elliptical one about the breast, the upper end being carried out on the arm. The exposure offered by either of these incisions is satisfactory, but the closure is not as satisfactory.

When the modified Rodman or transverse axillary incision is used, the axilla is exposed more fully and there is less trauma to the tissues of the arm. The result is a quicker and more complete recovery of full arm function. There is no part of the scar extending onto the arm and the closure is more easily accomplished. Drainage is instituted at the time of operation. The wound is closed with the arm held in abduction. Post-operative swelling of the arm is rare. By the end of two weeks, patients are ordinarily able to lift the arm to the horizontal position. Usually they are able to comb their hair by the time they leave the hospital.

#### X-RAY

It has been customary with some surgeons to use pre-operative X-ray in order to decrease the malignancy of the cancer cells at the time of operation. This practice is responsible for greater wound sepsis, more sloughing in the flaps, and more bleeding during and following operation.

Post-operative X-ray does not offer any particular objections. It is doubtful whether it does any good, however. Greenough<sup>3</sup> studied two small groups of cases at the Massachusetts General Hospital. The percentage alive at the end of a three-year period was exactly the same in those who had had X-ray before or after the operation as in those who had not. Wound healing was defective in 54 per cent with pre-operative X-ray and in 18 per cent without it. We are using X-ray today in cases where we think there is some doubt as to the complete removal



of the disease and in those cases proven to be highly malignant.

The usual classification of cancer of the breast is into medullary, scirrhous or adenocarcinoma groups. Stimulated by original work done by MacCarty and Broders, Greenough<sup>4</sup> made a study of the degree of malignancy in cancer of the breast. Slides from various cases of cancer were studied for the amount of glandular arrangement, hyperchromatism, the number of mitoses, evidences of secretory activity and the variation in the size of the cells. The slides were divided into four groups according to their degree of malignancy, without knowing the end results of the cases. The records were then produced and the following results noted. In Class 1, where the cells were differentiated a great deal and where they approached the normal structures of the breast, there were 66 per cent cures at the end of three years. In Class 2, where there was less differentiation, there were 47 per cent cures, while in Class 3, 23 per cent. In the highest grade of malignancy there were no cures.

This study has been carried out in other groups of cancer cases and appears to be a fairly accurate classification. It explains many things. It explains why one patient with breast cancer, seen early and given adequate operative treatment, lives but a short time, while another, seen late and operated on inadequately, gets well. It also explains why some cases are cured or arrested by X-ray while others are not helped.

Local recurrences in the region of the scar are usually due to inadequate removal of the skin or the deep fascia of the chest wall. Treatment is by further excision, if possible. X-ray may clear up certain cases. Radium is not effective.

Glandular metastases are best treated by X-ray, whether they are present above the clavicles, in the axillae, or in the mediastinum. There is no doubt that X-ray prolongs the life of many of these patients as well as relieves their pain. Metastasis to the pleura with the formation of fluid is a distressing condition for which little can be done. Liver involvement with ascites is a rapidly fatal complication. Bone metastasis occurs in perhaps 15 per cent of the recurrent cases. A spontaneous fracture may be the first symptom. The bones most frequently involved are the femur, humerus, ribs, vertebrae, clavicle, and skull, in this order. X-ray treatment may destroy bone metastases and stimulate the formation of new bone.

## RESULTS

Five-year end results have been obtained in three series of cases at the Massachusetts General Hospital by Dr. Greenough and Dr. Simmons<sup>1,2</sup>. These covered all cases entering the wards in the years 1894-1904, 1911-1914, and 1918-1920. There were 706 primary cases in all. End results were obtained in 638. At the end of five years, 21 per cent of the first series were alive and well, 32 per cent of the second, and 30 per cent of the third. This is about the same percentage reported in other clinics. If those cases with axillary glands are separated from those without glands, it is seen that the prognosis as to life is much shorter in the former than in the latter.

The writer has recently studied a group of 100 cancers of the breast<sup>3</sup> which had no treatment, either operative, X-ray, or radium. It was felt that if we were to lay emphasis on our operative end results we should know how long a series of patients lived without any treatment. These case records were obtained from the Huntington Hospital and the House of the Good Samaritan. The length of time from the onset of the disease to death was charted. At the end of three years, 40 per cent were alive, 22 per cent after five years, 9 per cent after seven years, and 5 per cent after ten years. Of course, it must be borne in mind that while these patients were alive, they had cancer every day of that ten years. The curve obtained by charting these results has been compared with two other groups, a series of sixty-six radical operations, and a series of sixteen selected cases in which no axillary glands were involved. In the former series 62 per cent and in the latter 35 per cent were well and free from disease at the end of seven years. This, of course, is additional evidence that operation is worth while and that early cases can be given a much better prognosis than late cases.

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## THE HERITAGE OF MIDDLESEX SOUTH\*

BY DWIGHT O'HARA, M.D.

If I were bold enough, and if I had sufficient time at my disposal, I would paraphrase the opening sentence of Lord Macaulay's History of

England and say: "I purpose to write the history of Middlesex South from the accession of King James the Second down to a time which is within the memory of men still living." Fortunately my orientation as to time and place will

\*The Annual Oration, delivered to the Middlesex South District Medical Society, at Cambridge, Mass., April 20, 1927.



spare you from such an ambitious attempt, however misleading my choice of title may seem to some of you.

We are very much the same kind of human beings as those who have gone before us. As physicians our responsibilities are very much the same as theirs. We may solve our problems in different ways; but the day will surely come when our modern theories will be quaint and amusing to a still more modern age. It is therefore in a spirit of reverence that I invite you to look backward at some of the medical men to whom we are the proud successors. In what follows I shall be content to recall some of the more interesting characters and events which have come to my notice, and a few of which have had but scant attention from medical biographers and historians. If, then, I fail to do justice to the memory of many of our predecessors, I plead with the words of Sir Thomas Browne, that "the iniquity of oblivion blindly scattereth her poppy, and deals with the memory of men without distinction to merit of perpetuity."

When James the Second ascended the throne of England in 1685, Sydenham had just told the world how to use Peruvian bark; the great Medical School at Edinburgh had not yet been founded; a century was still to elapse before the appearance of Withering's pharmacological classic "The Account of The Foxglove"; and it was not until one hundred and thirty years later that Laennec introduced the stethoscope to the practice of medicine. Most of the medical practice in the colonies had been carried on by the ministers, many of whom had been educated in the medical profession before they crossed the Atlantic. That high ethical standards obtained is shown by the County records of 1631, in which it is stated that Nicholas Knapp of Watertown was fined five pounds for claiming to cure the scurvy by a water of no value "yt he solde att a very deare rate."

Although an account of any physician of the seventeenth century is necessarily colorless, the scanty material which is available gives an idea of the position of the doctor in the community. Dr. Philip Shattuck is an example. He was an older brother of William, the ancestor of Dr. F. C. Shattuck of Boston. Philip was born in Watertown, in 1648. He lived "in the vicinity of the Waverley Station on the Fitchburgh R. R., easterly of Beaver Brook," from where his estate extended northerly into what then was Cambridge. He is recorded as a "physician of eminence and for a long period a leading man in the public affairs of the town. He was often chosen moderator of the town meetings, and held the offices of Assessor, Town Treasurer, Chairman of the Selectmen," etc. After practicing for more than fifty years, he died within the present limits of Waltham, in 1722. His death was the occasion for the selectmen to order "one

pair of gloves for the Rev. Warham Williams, four pair for the bearers, and also cider for the people who attended the funeral." He lies buried in the Grove Street Cemetery in Waltham.

The Rev. Warham Williams, who got the gloves (and presumably his share of the cider) at Philip Shattuck's funeral, had been a classmate at Harvard with Ebenezer Roby. Ebenezer Roby, according to the legend on his tombstone in the old cemetery in Wayland, was born "of respectable parentage" in 1701. There was then in vogue the ancient system of apprenticeship, by which the medical practitioner bound himself to teach the art and mystery of his craft to a pupil, who in turn served his master for a definite period of years. There has recently disappeared from the Wayland Library a journal of Dr. Roby's recounting "ye most remarkable cases which occurred while living with ye most ingenious and learned Dr. Berry at Ipswich." It is doubtless the account of Dr. Roby's apprenticeship—a document priceless to our medical history—may its present owner preserve it! Dr. Roby's tombstone further tells us that "in 1725 he fixed his residence in Sudbury in the character of a physician, where he was long distinguished for his ability and success in the healing art." Although Thacher gives no account of Dr. Roby, he refers to him as the preceptor of Oliver Prescott of Groton, who was a physician, but more famous as a statesman of revolutionary times. Thacher also says that Dr. Roby was a disciple of the celebrated Boerhaave. Of this there must be some doubt, for although he visited the anatomy hall, the physick garden and the library in Leyden in 1726, when Boerhaave was at his very zenith, he doesn't even mention the great master in his diary. He was a "Selectman and Magistrate" of Sudbury. When he was married, Dr. Roby received a slave named Nero for a wedding present. His practice extended over a wide area, some of his account sheets showing entries for visits in Watertown and Cambridge. Here are some specimens of Dr. Roby's bills rendered to the town of Sudbury for services to some of the French Neutrals, of which each town had its quota to care for. These were the exiles whose story was later told by Longfellow in his poem "Evangeline." Bills seem to have been rendered in those days, not for professional services, but for "sundry medicines and journeys." Thus "1756, March 22, to sundry medicines and journey in the night west side the river, 0/5/8." Also, "to do. for the old gentleman when he fell off the house and was greatly bruised and sick of a fever, the clavicula being broke, 1/6."

The greatest of all medical achievements of the eighteenth century was the introduction of the practice of immunity. On June 27, 1721, Zabdiel Boylston of Boston inoculated his own children for small-pox. This was only six weeks

after Lady Montague introduced the procedure in England, and it seems to be an example of one of those advances that were made simultaneously in two places. The idea of "medical liberty" had already dawned, for Dr. Boylston was threatened with lynching, was the target for a bomb which fortunately failed to explode, and could not go upon the street or visit his patients except in darkness and by stealth. Strangely enough, Dr. Boylston was mainly supported by the clergy and condemned by the physicians. There were, however, two intrepid doctors who recognized the value of small-pox inoculation. They are identified only by the references to them as "Roby in Cambridge" and "Thompson in Roxbury." With their help Dr. Boylston inoculated two hundred and eighty-six people in the first year. Of these six died—a mortality of 2.1 per cent. During the same time 5,759 people contracted the disease naturally, with a mortality of 14.6 per cent.

Our Ebenezer Roby graduated from Harvard in 1719. The faithful "Roby of Cambridge" practiced inoculation in 1721. Our Dr. Roby did not move to Sudbury until 1725, and inasmuch as there are no references to another Dr. Roby to be found in this period, it seems altogether likely that Ebenezer Roby of Sudbury and "Roby of Cambridge" were the same person. The importance of this identification in the history of Middlesex South is great, because, as we shall see, it connects this district with the origin on this Continent of each step in the eradication of the first, and still the greatest scourge, to be conquered by mankind. Let it also be remembered that Dr. Roby was a general practitioner.

One year older than Dr. Roby, Simon Tufts of Medford began practice in that town in 1725, the same year that Roby moved to Sudbury. Dr. Simon Tufts is to be remembered for three reasons. First—among his many medical pupils was General John Thomas, who later became famous at Dorchester Heights; second—he was the father of Cotton Tufts of Weymouth who was one of the prominent founders of our Massachusetts Medical Society; and third—he was the father of Simon Tufts the younger, who succeeded to his practice, and more than any other man moulded the character of Colonel John Brooks, physician, statesman, revolutionary patriot, confidant of General Washington, President of the Massachusetts Medical Society and Governor of the Commonwealth.

Simon Tufts, the younger, took up the practice of his father in Medford in 1746. The affection and respect of the people of Medford for these two men was such that they retained the same circle of patients for a full three score of years. Young Simon Tufts died at the age of sixty of an illness not named, but so well described that there is little doubt that it was pulmonary tuberculosis. Thacher calls it a little remarkable "that the father and son, who were

noted for their mild domestic virtues, should educate two men who became generals in our revolutionary war." The two Simon Tufts lie buried together in Medford, where they were born and lived. Over them is the inscription:

"Both eminent in their profession,  
Just also towards men, and devout towards God."

We have now reached the period when a host of revolutionary physicians call for our attention: John Brooks of Medford, Isaac Foster and Josiah Bartlett of Charlestown, John King of Newton and many others. Any account that I could give of these men would be mainly a restatement of their eulogies by others, so I shall pass them by and consider instead the character of Marshall Spring of Watertown, an enigma in our medical history.

Dr. Burrage has referred to Marshall Spring as "a hot-headed fellow" with "characteristics of force and a not too careful regard for the opinions of his fellow-men." While there is much to support Dr. Burrage's harsh phraseology, it is only fair to point out that Dr. Burrage was writing the history of the Massachusetts Medical Society, and that Dr. Spring had the distinction of being the first fellow to be disciplined by the Society.

Marshall Spring was born in Watertown and graduated from Harvard in 1762. He was educated and assisted in starting practice by his uncle, Dr. Josiah Converse, also of Watertown. His success as a young man was great and an immense practice was soon built up which continued unabated to the close of his life. He cared little for theories which did not accord with his own views of practice. He had little use for books, abhorred the tricks and mummery of the profession, and used no learned terms. Among the circumstances that contributed to his great reputation was his treatment of tetanus by the use of ardent spirit. Observing the total relaxation of muscles in a fit of intoxication, the idea occurred to him that ardent spirits by inducing drunkenness might prove a remedy in tetanus.—The first trial was attended by success, and during the rest of his life he used the treatment with confidence. Writing in 1828 Thacher said: "The same confidence still prevails among the people within the circle of his practice, and whenever symptoms of lock-jaw are discovered, immediate recourse is had to this supposed powerful remedy." I wonder if our Watertown brethren cannot quote us examples of the practice persisting even to this day! Among many anecdotes which indicate the shrewdness of the man is a prescription handed down by word of mouth—a prescription for indigestion—which is to "drink the hundredth stroke of the pump before each meal."

The American Revolution found Dr. Spring in full and successful practice. He worked among a people remarkable for their unanimity in all measures of resistance to the mother coun-

try. When the crisis came, it found Dr. Spring's mind settled in the full and firm conviction of the entire inexpediency of resistance. He maintained that the people were incapable of self-government, and on that ground he opposed the adoption of the Federal Constitution as being too feeble and not sufficiently stringent in its tone. Yet at the first election of Mr. Jefferson to the Presidency, he joined the popular party that had opposed the adoption of the Constitution on the opposite ground—that it was too stringent. Bond quotes him as saying that "he was nearly losing both property and country by opposing the popular party in the revolution, and he did not intend to run that risk a second time."

In his person Dr. Spring was a man of impressive appearance—short, compact, and well proportioned. After the age of fifty, with fair and florid complexion, and snow-white hair, he was spoken of as one of the handsomest men of his time. It was asserted that, in 1776, when party zeal ran high and such toriyism as his was not even tolerated by the law, he would have been sent out of the country, "if the exigencies of the ladies had not prevented." His professional services were highly appreciated, and he gave them without stint to his fellow-men. In spite of his political views, he arrived early on the field at Lexington on the nineteenth of April, 1775, and devoted his best skill and care to the wounded citizens. He held the virtue of gratitude in higher estimation than most men do, and whoever showed him a grateful disposition had a sure passport to his favor—a true medical characteristic.

In his later years Dr. Spring suffered from shortness of breath on exertion, and he died, probably of arteriosclerosis and myocardial failure, on January seventh, 1818. Although Marshall Spring was opposed to most of the popular movements of his day—movements which we are now taught to look upon as the most glorious in our history—we must remember that he was a man of logic and understanding, that he knew the situations with which he dealt first hand, and that he was an untiring worker for what he thought to be right. I think he should be looked upon not as one of the army of disgruntled kickers, but as an example of that small but valuable class of men without whom the best of governments would become intolerable—the leaders of the opposition. With this appraisal I will leave him.

From the founding of the Harvard Medical School in 1783 until its removal to Boston in 1810, the main interest in medical education centered in Cambridge. For a picture of medical life in Cambridge at this time I will quote directly from the article by Dr. Oliver Wendell Holmes in the Memorial History of Boston:

"Still in the background, and a little at one side, for they were not Boston physicians, but

lived on the other shore of the river at Cambridge, are three figures belonging to three physicians, each of whom is a typical representative of a class, all distinct images in my memory.

"Benjamin Waterhouse, whose name stands on his title pages over an inverted pyramid of titles of great dimensions, studied in London, Edinburgh, and Leyden, at the last of which places he took his medical degree in the year 1780. . . . He will be long and deservedly remembered as having introduced vaccination into the western world. . . . He may have voluntarily relinquished practice; but whether this were so or not, I never remember hearing of any patient under his care. He had, however, vaccinated great numbers of persons, myself among the rest. He probably liked to write and lecture and talk about medicine better than to practice it. A brisk, dapper old gentleman, with hair tied in a ribbon behind, and I think powdered, marching smartly about with his gold-headed cane, with a look of questioning sagacity, and an utterance of oracular gravity, the good people of Cambridge listened to his learned talk when they were well, and sent for one of the other two doctors when they were sick. . . .

"While Dr. Waterhouse was walking about with his gold-headed cane, like a London physician minus his chariot and his patients, Dr. William Gamage was riding around on a rufous-colored horse with his saddle-bags behind him, and stopping at door after door. Grim, taciturn, rough in aspect, his visits to the household were the nightmare of the nursery. He would look at the tongue, feel of the pulse, and shake from one of his phials a horrible mound of powdered ipecac, or a revolting heap of rufous—good stirring remedies that meant business, but left a flavor behind them which embittered the recollection of childhood. . . . While Dr. Waterhouse was airing his erudition on foot and Dr. Gamage was jogging round on horseback with his saddle bags, Dr. Timothy L. Jenkinson was driving about in an ancient chaise drawn by a venerable nag, chiefly, it may be suspected, to exercise the quadruped and get the benefit of the fresh air for himself, for his practice could hardly have been considerable, although I do remember hearing that he was employed by one family. I believe he was the safest practitioner of the three, for he was accused of overfondness for old women's harmless vegetable prescriptions, which means that he gave nature a fairer chance than she is apt to have in the hands of learned theorists and heroic routinists."

Returning now to Benjamin Waterhouse, the first Hersey Professor of Theory and Practice in the Harvard Medical School, we find that Jenner had communicated with him on the subject of cow-pox and vaccination in 1799, the year following the publication of his famous "Inquiry." Waterhouse at once interested himself

in the subject and published his first paper during the same year, entitled, "Something Curious in the Medical Line." He immediately vaccinated his own children and the following year published a second paper entitled, "A Prospect of Exterminating the Small-pox." To Benjamin Waterhouse of Cambridge, then, belongs the credit of introducing vaccination into this country. This was the second great preventive step in the history of medicine.

Let us now turn to Waltham and review a curious succession of doctors culminating in a man whom I am going to call the great general practitioner of the nineteenth century in Middlesex South—Horatio Adams. About 1816 Ebenezer Hobbs, Jr., a graduate of the Harvard Medical School, began the practice of medicine in Waltham. Three years later he forsook practice and went to work as a clerk for the Boston Manufacturing Company, a firm which had begun the manufacture of cotton cloth in Waltham seven years before. Dr. Hobbs soon became agent and later treasurer of this mill, and it was under his direction that the firm grew to nearly its present proportions.

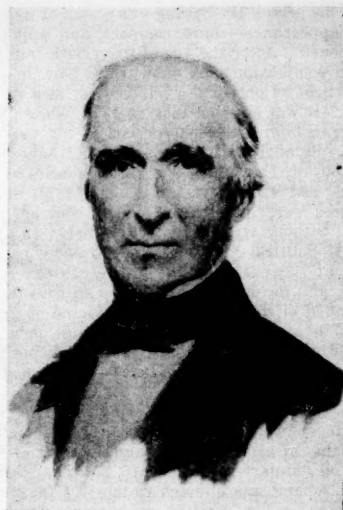
Dr. Hobbs relinquished his practice to Dr. Samuel L. Dana, also a Harvard graduate. Dr. Dana was not only an able physician but a chemist, and he very soon interested himself in the Newton Chemical Works, a prosperous business in those days. In it he made not only his fortune but an enviable reputation. Some of his papers and reports on medico-chemical subjects are among the most beautifully written scientific papers of the day.

The *Vis Medicatrix Naturae* idea has ever been a difficult one for the profession to explain to the laity. So it was when Dr. Dana wanted to convince the City Fathers of Lowell that in spite of the fact that most of their citizens remained well, their drinking water was nevertheless poisoned with lead. He did it with a scientific precision and in a shade of purple hard to match in municipal reports, as follows: "... it is found by experience that the young, the delicate, soonest succumb under the effects of lead drank in their daily drink, and like the dews of heaven, descending on all, the gentlest and fairest feel the chill which soon closes in death."

Another Harvard graduate succeeded to Dr. Dana's practice in the person of Dr. Isaac Mulliken. The practice, however, was fated, for Dr. Mulliken soon took charge of the Waltham Bleachery, then an infant industry and one which later made his fortune for him. This was in 1826, and the fourth Harvard graduate to Adams. The captains of industry must have taken up the practice in ten years was Horatio Adams. The habit of going to this office for new material, for Dr. Adams was very soon a director of the Fitchburg Railroad, and in a few years great pressure was brought to bear upon him to

accept its presidency. He was also the first president of the Waltham Watch Company. But Horatio Adams remained a humble practitioner of medicine, and as such his city and his county owe him a debt of gratitude. Among the many things which he did in the routine course of his work, not the least was accomplished on the 22nd of June, 1855, when he helped Alfred Worcester into this world.

The most thrilling, and perhaps the most valuable contributions to medical progress have always been those of general practitioners, contributions made midst the distractions of midwifery and the other endemic irregularities in the life of man. Horatio Adams made two such



HORATIO ADAMS OF WALTHAM—1801-1861

great contributions, now all but forgotten in the scuffle of specialization. While Middlesex South may well be proud of the works of Horatio Adams of Waltham, she may get her greatest inspiration from the attitude in which he undertook his labors. I will tell it in his own modest words:

"We certainly owe our predecessors a debt of gratitude for the copious means of knowledge which they have transmitted to us. Have we not, then, on our part, a duty to perform to those who are to succeed us? Shall we simply hand down to them what has been so liberally bequeathed to us? Or shall we add to it, and give to it the impress of our own times? I conceive it to be the bounden duty of each one of us to do the little that in him lies to extend the boundaries of medical science. This result cannot be attained without the untiring and suc-



cessive labors of the many. The experience of no one man, however extensive it may be, is alone sufficient to accomplish, to any great extent, so important an object. Yet each one can do something. His investigations, if properly conducted, will make some addition to the accumulating mass. If he would diligently and accurately investigate some one subject, the result, small though it may appear to him, would, nevertheless, add to the increasing aggregate."

Following the work of Jenner and its introduction on this continent by Waterhouse, the first quarter of the nineteenth century had witnessed a rather widespread adoption of vaccination in New England, but from 1825 to 1855 public confidence had been somewhat shaken in the permanency of the immunity conferred. This feeling was confirmed by the prevalence of small-pox from about 1835 to 1845. Adams undertook an investigation of the subject for the purpose of "satisfying the public mind, and restoring that confidence in the protective power of the disease, so essential to its universal adoption." After a critical review of the literature and of several hundred vaccinations and revaccinations occurring in his own practice, he came to the conclusion that "the protective power of the vaccine disease is the same now as at any former period in its history, and that any apparent deviation from this which may have, from time to time, shown itself in the more frequent occurrence of small-pox after vaccination, is not to be attributed to any deterioration in the agent itself, but to the neglect of proper care in its application!"

The question of what constituted the proper technique for vaccination must indeed have been a great one, for Semmelweis had not yet given the first practical demonstration of antiseptics, and Lister was still a little boy. One of the great discoveries of the age, and one which has not yet been thoroughly elucidated by the immunologists, was that cow-pox could be produced by inoculating a cow with small-pox. This was first done by Mr. Ceeley, in England, in 1839, and was first done on this continent the following year by Dr. Adams. Just as Dr. Boylston and Dr. Waterhouse had first inoculated their own children in their pioneer work, so Dr. Adams inoculated his own cows. This was done in his barn at the corner of Lyman and Summer streets in Waltham. Here is his description of the operation: "On the 11th of January, 1840, I made several punctures with the point of a lancet under the cuticle on the right labium pudendi of two different cows; none of the punctures were sufficiently deep to draw blood. Into each of them was introduced a pointed quill well deluged with variolous matter, and allowed to remain for half an hour." He made daily observations on these punctures and on the 19th found that the developing vesicles had depressed centers. On the 20th, he punctured one of the

vesicles and charged twenty quills with the transparent lymph which oozed from the opening. He dipped several more quills on the 22nd. After observing the cows and ascertaining that they remained perfectly well, many persons were vaccinated, "and in every instance the true vaccine disease was the result."

For many years thereafter Waltham was looked to as the best source of vaccine virus for greater Boston. The material was not obtained from new cows, however, but from the arms of people who had been successfully vaccinated. The physicians saved the crusts from the arms of their healthy patients, often performing the operation free of charge provided they received the crust in good condition. Later these crusts were bought by Codman and Shurtleff, who ground them up in glycerine and distributed them. Dr. Worcester tells me that when he began to practice, in 1884, the grandmothers sometimes asked him if he did not want them to save the crusts and bring them back.

Dr. Adams' second contribution to medical science was an exhaustive report: "On the Action of Water on Lead Pipes, and the Diseases proceeding from it." It was presented to the American Medical Association in 1852, at a time when even members of the medical profession were in some cases unwilling to admit that lead in the drinking water might be a source of illness. Dr. Adams not only averred that lead poisoning might be caused by a contamination of drinking water by contact with lead containers or conduits, but gathered a large number of cases from his own practice and those of his friends. After a precise consideration of the chemical and clinical aspects of the subject, there follow some case reports. One of these is in the form of a letter to Dr. Adams from the patient, J. S. Copley Greene. Although Copley Greene never practiced medicine, he was "a gentleman of wealth and education, and a graduate of the Boston Medical School." Why his letter has never found its way into the textbooks of pharmacology I do not know, nor will you after I have read the following passage from it. I am going to quote the passage in its entirety—to summarize it would be to desecrate it. Copley Greene had been suffering with a lead paralysis, for which he had tried electromagnetic treatments without effect—but I must let him tell his own story:

"... Early in August I read Dr. Dana's translation of Tanquerel's invaluable work, and proposed to you to try the effect of strychnine, and with your approval I began, I believe, on the 2nd. or 3d. day of August, first with a pill of one-sixth of a grain, the next day a pill morning and evening of one-sixth grain each, and on the 6th. one-third of a grain in the morning and one-sixth at night. The effect of the first dose which I took was very similar to that of electromagnetism, particularly the feeling in the foot; it was





intermitting about every tenth stroke. Great twitching and jerking of the muscles round the mouth. I could speak only in a whisper. The jaws were held tight together, so that, even after some time, it was very difficult to get a little water into the mouth; after I got it into the mouth, I swallowed it. Occasionally there was involuntary gritting of the teeth. Pain in the nape of the neck very severe, so that a man's whole force was exerted in pressing against it. At eleven, A.M., I began to inhale chloroform; from two to four full inspirations at a time, repeated as often as the spasm became more violent. This acted like a charm; it kept the spasm under, relieved the breathing, and, in an hour or two after first taking it, the intermissions of the pulse entirely ceased. The symptoms continued, though gradually diminishing, till between two and three o'clock. At a quarter before four, I was able to sit up and eat some dinner, and between five and six o'clock, I took a drive in the carriage."

Apparently undaunted by his imitation of the strychnine frog, Copley Greene continued to take one-third of a grain every morning and one-sixth of a grain every evening for the next three weeks. The effects of this treatment he recorded as follows:

"Sept. 12th. Walked out of doors on crutches, without other help.

"24th. Went to church in Boston in the afternoon, not much fatigued.

"Oct. 2d. Played two games of billiards, one hundred each, and beat both.

"19th. Walked a mile, with my wife and a cane.

"20th. Walked a mile with cane only."

I don't know that anyone even congratulated Copley Greene on his recovery. Dr. Adams certainly took it as a matter of course, and Copley Greene closes his letter by saying: "I cannot conclude, without an expression of my sincere gratitude to you, for discovering the true cause of my complaint, and for your unwearied attention and kindness in the treatment of it."

The doctors of 1850, of course, made a living, although a glance at the fee tables of the day makes one wonder what kind of a living it could have been, and why more of them did not follow the examples of Drs. Hobbs, Dana and Mulliken, and go into industrial pursuits. The fees quoted in this table probably represent those obtaining throughout the county at that time.

For a visit in the village.....	.75
do. out of the village.....	1.00
For a visit and passing catheter.....	2.00
do. frequently repeated and for that purpose only.....	1.00
For a visit and extracting tooth.....	.75
For extracting tooth at Surgeon's house.....	.25
For venesection at the Surgeon's house.....	.75
For rising in the night and a visit, the night being considered as beginning at 10 o'clock and ending at sunrise.....	1.50-2.00

For a letter of advise.....	3.00
For a case of gonorrhoea.....	5.00
For a case of syphilis.....	10.00
For a case of midwifery.....	6.00
For a case of midwifery if ether is used.....	8.00
For a case of twin birth.....	9.00
For instrumental labor.....	10.00
For reducing hernia by taxis.....	2.50-5.00
Operation for strangulated hernia, and capital operations, such as amputations of large limbs, lithotomy, trepanning and amputation of the mammae.....	30.00
For tapping for dropsy, and reducing luxations or fractures of large bones.....	5.00

While Horatio Adams was studying vaccination and lead poisoning, there came from New Hampshire to the westerly part of Charlestown another general practitioner by the name of Luther V. Bell. Before coming to us Dr. Bell had been studying the methods of caring for the insane and had already started an agitation in New Hampshire which later resulted in the establishment of their first Insane Hospital. Dr. Bell came to Massachusetts as the third superintendent of the McLean Hospital. During the twenty years that he served in this capacity, the westerly part of Charlestown, where the Hospital was then located, became Somerville, the institution itself grew in all directions, while its popularity grew to such an extent that more patients were turned away than were admitted.

Luther Bell was not only a capable executive, but one of the foremost clinical psychiatrists of his day. He was the first to call attention to the fact that other countries were casting their vagrants, paupers and insane upon our shores. His contributions to the literature were many. He first recognized and described a form of the toxic-infective psychoses which for years was known as "Bell's Mania." He was one of the first to do away with the unnecessary restraint of insane patients. He vigorously fought one of the ever-recurring waves of spiritualism which swept the country in the late forties, believing it to be illogical and unscientific. Regarding it he said: "I have always supposed that I did as much as any man in New England to put a stop to that gigantic epidemic, by demonstrating that its facts were only those of old mesmerism itself, and that the mediums never told what the inquirer did not know before." He was the orator of the Massachusetts Medical Society in 1848, and its president for the term between 1857 and 1859.

Although Dr. Bell had resigned from his position at the McLean, on account of failing health, three years before the outbreak of the Civil War, when that conflict broke he applied for and received a commission. Physically failing, he endured the hardships of war, and finally died in camp with the rank of Brigade Surgeon. In a letter to a friend, written less than a month before his death, Dr. Bell said: "I never have spent one night out of camp since I came into it, and a bed and myself have been practically

strangers these seven months. Yet I never have had one beginning of a regret at my decision to devote what may be left of life and ability to the great cause. I have, as you know, four young motherless children. Painful as it is to leave such a charge, even in the worthiest hands, I have forced myself into reconciliation by the reflection that the great issue under the stern arbitrament of arms is, whether or not our children are to have a country." North and South, many gave as much, but none gave more in the War of the Rebellion than Luther Bell of Somerville.

Turning now to the Newtons, the difficulty is not to find an eminent physician, but to select one from the many who have lived and practiced there. Newton owes much of her early prosperity and later civil development to her physicians. Many of them were scholars. No less than four of them were prominent organizers in the cause of "temperance," a burning issue of days gone by. One of them, Joseph Warren, was President Lincoln's personal physician—an honor less doubtful than we have seen it in recent years. Dr. Warren was the first man to do thoracentesis, aspirating both the pleural and pericardial sacs, was the originator of a technique for an operation for hernia which he demonstrated both in this country and in England, and an able contributor to the surgical literature of his day.

We are reaching the time of Pasteur and Lister—that time "which is within the memory of men still living"—the few decades in which Dr. Howard Kelly says that "the deeds of our profession have been greater than in all the millenniums preceding." I have nearly exhausted our time but the end of our subject is not yet within sight. It would be presumptuous in me to speak of the works of such men as Drs. Hosmer, Cutler, Marey, Wyman, Fernald, Walcott, Lincoln Stone, Worcester, Stevens and A. K. Stone. The mere mention of their names, however, reminds us of the fact that Middlesex South has continued and is continuing to contribute her large share to the progress of our profession. Indeed, I have but set the stage for another orator and another year.

I will close by quoting the words with which my great physician, Horatio Adams, ended his oration to the Massachusetts Medical Society on the twenty-sixth of May, 1858. After alluding to the deceased members, he said: ". . . May their example stimulate us to renewed efforts to alleviate the sufferings of humanity, and to prepare ourselves for that change which awaits us all; so that when we are called upon to bow before disease, from which it has been the labor of our lives to rescue our fellow beings, we may be able to do it with submission and hope, and leave examples worthy to cheer and guide those who enter into our labors."

NOTE:—It has been called to the author's attention that to Dr. Morrill Wyman of Cambridge belongs the credit for the first thoracentesis. The source of the data used on that point was *The History of Middlesex County*, J. W. Lewis & Co., 1890, Volume III, page 139, in which it is stated that Joseph Warren of Newton "was among the first, if not the first, to aspirate the pericardium (April, 1855), and to perform the operation of paracentesis thoracis." Further investigation, however, has shown that Hippocrates "used the knife, the caustic and the hot iron" to evacuate pus from the pleural cavity, and that Paré was probably the first to use the trocar and the canula for empyema. In a paper by Dr. Leale, published in 1874, it is stated that "During the past twenty years, Dr. Henry I. Bowditch, of Boston, has operated on at least one hundred and fifty-four persons, making two hundred and fifty tapplings, more times, perhaps, than any other man in this country. In Dr. Bowditch's first case, the trocar and canula of Dr. Morrill Wyman were used. . . ."

#### A TEN YEAR SURVEY OF THE MULBURY BEND DISTRICT OF NEW YORK CITY

THE Association for Improving the Condition of the Poor has published a report of its investigation of the conditions in the section of New York City called Mulbury Bend where persons from foreign countries and their families congregate. Among the diseases prevalent in this section pneumonia caused the highest mortality, heart disease second, and tuberculosis third. The Association concludes that bad housing is largely responsible for the large number of cases of pulmonary diseases. The pneumonia mortality for example being 93 per cent higher than the city rate, the pulmonary tuberculosis rate for the district being 48 per cent higher than the city rate. The population is gradually moving away from that section so that it will become easier to improve the health condition.

#### THE TYPHOID MENACE

SINCE the Montreal epidemic has reached such staggering proportions, the advice given by our Health Commissioner some months ago is pertinent.

"All milk producers should be scrupulously careful not to employ any one with a history of typhoid fever except after proving by laboratory examination that he is not a carrier. Even then, with the fallibility of human memory and honesty, the protection furnished by adequate pasteurization should be also utilized. There is hope that the present Legislature will authorize adequate supervision of all pasteurizing plants. So long as raw milk is on the market we must expect repetitions of the recent tragedies at the hospital in Waverley, at Lincoln and Concord, and Lowell and Billerica."

**Case Records  
of the  
Massachusetts General Hospital**

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN  
WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY R. C. CABOT, M.D.  
F. M. PAINTER, A.B., ASSISTANT EDITOR

**CASE 13281**

**A CARDIAC CASE**

**MEDICAL DEPARTMENT**

*First admission.* A married Irishwoman thirty-four years old was brought to the Emergency Ward July 8, 1907.

For the past year she had been unable to work on account of extreme shortness of breath and swelling of the feet and legs. She felt well when at rest, and for the past year "had done nothing but take care of herself." During February, March and April before admission she had frequent vomiting and stomach discomfort. Recently her urine had been high colored.

She had scarlet fever, measles, chorea and erysipelas in childhood. Ever since she could remember she had had slight dyspnea on exertion. She had gone through six confinements without difficulty.

Clinical examination showed a fairly well nourished woman with cyanotic lips lying comfortably on three pillows. Teeth all false. Apex impulse of the heart and left border of dullness in the fifth space in the nipple line. No enlargement to the right. Action regular. Sounds of good quality. First sound short and sharp. Pulmonic second sound accentuated. A loud systolic murmur at the apex transmitted to the axilla. No thrill. Pulses of fair volume and tension. Artery walls palpable and slightly tortuous. Very slight dullness at the apex of the right lung behind. At the right apex in front a few medium moist râles which disappeared on cough. Liver dullness from the fifth space in the nipple line to the level of the umbilicus, where the edge was felt. Very slight edema of the lower legs. Pupils and reflexes normal.

Urine not remarkable. Blood normal. Temperature 98.4° to 96.1°. Pulse and respirations normal.

The patient made some improvement. The heart action became regular and vigorous. She continued to be cyanotic and had edema of the feet when she was on them. She was thought to be overworked and exhausted. For a few days before her discharge she complained of slight epigastric pain. The liver edge was felt, slightly tender, halfway between the costal margin and the umbilicus. July 23 she was discharged unrelieved.

*History of interval.* After leaving the hospital she "kept very quiet," but did the cooking for her family of eight. The edema of her feet and abdomen increased. Five weeks before her readmission her abdomen was tapped and six quarts of fluid withdrawn. She had great dyspnea and a little cough and sputum. She ate very little. When on her feet she was incontinent. At her discharge she weighed 125 pounds; upon readmission she weighed 153, though her arms and face were thinner.

*Second admission, January 18, 1908.* Clinical examination as before except as noted. Numerous rose colored papules scattered over the chest. Conjunctivae pale. Throat reddened and slightly swollen. Breasts atrophic. Apex impulse of the heart and left border of dullness in the fifth space 2¼ inches outside the nipple line, 6 inches to the left of midsternum; right border of dullness an inch and a half to the right of midsternum. Action regular and slow. Sounds indistinct. Pulmonic second sound much accentuated. Slow gallop rhythm heard over the fourth interspace in the left parasternal line. Pulses normal. Numerous medium and coarse moist râles throughout the back and both axillae. Dullness and diminished voice sounds in both bases behind. Abdomen symmetrically distended. Umbilicus flushed. No fluid wave. Shifting dullness below the umbilicus and in the flanks. Liver dullness from the upper border of the fifth rib. The lower limit obscured by dullness in the abdomen. Edge not felt. Right knee-jerk present, left not obtained. Marked brawny edema of both legs and over the sacrum.

Urine not remarkable. Blood normal. Temperature 96.8° to 98.5°. Pulse and respirations normal.

Under digitalis and rest in bed the patient was comfortable and the ascites and edema decreased. The visiting physician observed a systolic retraction of the nipple, and considered the dropsy out of proportion to the heart signs. A record made in the Out-Patient Department some months previously noted a pericardial friction rub. February 2 there was less hydrothorax. February 3 the patient was discharged relieved, to talk over the question of operation with her family.

*History of interval.* During the following year she remained fairly quiet, doing a little housework. Her abdomen was tapped four times, in March, June, November and January, with the removal of five to seven and a half quarts of fluid each time. She was not particularly dyspneic unless she climbed stairs. She had very little cough. Edema of her lower legs was more or less constant, worse when she had been on her feet some time. Her abdomen was large. At the time of readmission she was passing very little urine. She had been on a dry diet during the year. She had taken large doses of digitalis steadily.

*Third admission, January 18, 1909.* Clinical examination showed marked emaciation. The skin was clear except for many trocar scars over the abdomen. Mucous membranes, hands, legs and feet cyanotic. Indefinite venous pulsation in neck. Both tonsils slightly enlarged. Systolic retraction, most marked in the third space to the left of the sternum, also in the neighborhood of the nipple. The apex impulse of the heart and left border of dullness corresponded in the fifth space just outside the nipple line  $4\frac{1}{2}$  inches to the left of midsternum. Right border an inch and a half to the right. A presystolic thrill at the apex. Sounds and action normal. First sound a little loud, preceded by a short systolic roll. Pulmonic second sound accentuated. Pulses slow, fair volume and tension. A harsh leathery friction rub heard in the right axilla and at the base behind. Lungs otherwise normal. Abdomen distended, rather tense, tympanitic above the umbilicus except in the flanks, more markedly on the right. In the flanks and below the umbilicus there was shifting dullness. Fluid wave present. Liver not enlarged. Veins over the left shin prominent. Moderate rather hard edema of the lower legs and ankles.

Urine, blood and chart as before.

At the end of four days the patient was very comfortable. The ascites was decreasing and the edema of the legs had disappeared. She began to menstruate for the first time in three months. An abdominal tap January 24 gave five quarts of straw colored slightly turbid fluid with a slight white precipitate, specific gravity 1.015, 2.1 per cent. albumen, about 95 per cent. lymphocytes, chiefly small. Examination after the tap showed a firm liver reaching two fingerbreadths below the costal margin and a barely perceptible spleen.

January 26 the following signs were noted: diffuse undulatory impulse of the heart, a diffuse systolic tug, diastolic collapse of cervical veins, fixed apex beat, diastolic shock.

The patient agreed to take the risk of operation. January 28 it was performed. She made a very good recovery from anesthesia, with practically no embarrassment of respiration, and was in satisfactory condition next day. In the evening however her breathing became rather difficult. With a bed rest, oxygen and morphia she was quieted, but had a rather poor night. In the morning her lips were cyanotic. The temperature ranged from  $98^{\circ}$  to  $100.7^{\circ}$ , the pulse from 116 to 127, the respirations from 28 to 42. January 31 she was put on digitalone. The pulse was fair and the ascites was gone. She had to sit up in bed to breathe. The lung seemed to be coming down well. February 2 the left chest was found to be flat from the second rib down. It was tapped, and 35 ounces of bloody fluid with some air obtained. The heart, which had been pushed well over toward the sternum, came back more nearly to its normal position, and the

area of flatness in the lung markedly decreased. The breathing seemed somewhat easier.

That night the patient was somewhat delirious. She was kept under the influence of morphia. Early in the morning of February 4 she was very cyanotic. Under oxygen she improved. February 5 the digitalone was decreased on account of the character of the pulse. The cyanosis was marked in the morning, but cleared up later in the day. The left chest was flat from the angle of the scapula down, with absent breath sounds. The heart did not seem to be pushed over. Early in the afternoon she became extremely cyanotic and within a few minutes died.

#### DISCUSSION

BY RICHARD C. CABOT, M.D.

#### NOTES ON THE HISTORY

At this stage our natural guess—which cannot be anything better than a guess—is that the dyspnea, swollen feet, high-colored urine, and stomach trouble are all manifestations of poor circulation, or chronic passive congestion, due presumably to heart trouble. The only important event in the past history from this point of view is the chorea. We have reason to believe that this trouble dates back to the old chorea.

#### NOTES ON THE PHYSICAL EXAMINATION

There is partial orthopnea.

I do not any longer look into the question of transmission of murmurs into the axilla or back. Any loud murmur is transmitted to the axilla and back, and as soon as we know that it is loud we know that it is going to be transmitted. Transmission means nothing but loudness.

There is possible, dubious evidence of tuberculosis at the right apex. The râles do not stay there, and they ought to stay there before we can be sure of them. The other signs, such as changes in breathing, fremitus, voice sounds, are not recorded. On the evidence here I should not make a diagnosis of incipient tuberculosis, but I should look for it and think about it again on subsequent examinations.

There is passive congestion of the liver with enlargement, probably due to the same thing we have been thinking about all along.

The urine is normal.

The temperature is normal.

What does a tender liver edge suggest?

A PHYSICIAN: Congestion.

DR. CABOT: Yes. A liver which is not congested is not ordinarily tender. If it is simply enlarged it is not tender. If it is tender it is congested.

A PHYSICIAN: She was thought to be overworked and exhausted, although she had spent one year taking care of herself.

DR. CABOT: I agree with your skepticism. That is a proper point.



We might speculate on what diagnosis they wrote down when they discharged her here. My guess is that they wrote the diagnosis of mitral regurgitation. They may have written myocarditis. These are the two commonest wrong diagnoses that I know.

MISS PAINTER: They wrote "Mitral insufficiency."

DR. CABOT: I will hereby go on record as betting that she did not have it, that is, not that alone. If she had anything at all wrong with the mitral valve, which I am not sure of yet, then she had stenosis as well as regurgitation. By following just such diagnoses to necropsy and not finding them true I have become skeptical.

I cannot make a diagnosis on this case on the facts given here.

Why had she gained so much weight?

A PHYSICIAN: Edema.

DR. CABOT: Yes. These are the conditions in which we hate to see people gain weight.

What are the chances of these "rose colored papules" being rose spots?

A PHYSICIAN: Without a history of fever and acute infection we should not think of it.

DR. CABOT: I agree that we have to have some other signs before we can make a diagnosis of rose spots.

If this second examination is correct the heart has changed a good deal in six months. I do not believe it is correct. I believe that we were wrong the first time or are wrong the second time. We do not often see a heart change so much in six months. A slow gallop rhythm ordinarily means a third heart sound, so I am suspicious there is a sound there that they have not heard.

There is edema of the lungs and probably fluid in the pleurae. We have ascites also.

I have no idea why the left knee-jerk was not obtained. I cannot begin any speculations on that yet.

They are thinking of chronic pericarditis. They noticed that there is a systolic retraction. That is, instead of going out with systole the nipple goes in with systole, and one might think that this is due to adhesions. But it is rash to think so. We often see this retraction when necropsy shows no adhesions. Systolic retractions are not at all uncommon in cases that show nothing wrong with the pericardium after death. But presumably they are thinking of chronic pericarditis because she had so much ascites. When we have relatively slight edema of the lungs and much ascites we wonder whether it is not due to pericarditis or cirrhosis of the liver. Both of these diseases will give this state of things.

The operation proposed might have been a Talma operation for cirrhosis of the liver, or it might have been an operation named for a gen-

tleman who was enthusiastic about stripping off the pericardium when it was adherent to the heart and freeing the heart. The patient generally died after the operation.

A PHYSICIAN: Why didn't we have a Wassermann in this case?

DR. CABOT: Years ago we didn't do that as a matter of routine. To-day we do.

In ordinary cardiac dropsy we do not often have a person tapped four times in a year. There seems to be something wrong with the liver, either the pericardial type or the ordinary cirrhosis.

"Venous pulsation" does not tell us anything of importance. There is no use looking at the neck for it.

The heart is quite different from what it was before. A presystolic thrill at the apex is important if true, because if there is a presystolic thrill it is absolutely certain that there is a presystolic murmur. There cannot be a vibration palpable to the hand and not audible to the ear.

"A harsh, leathery friction rub heard in the right axilla and at the base behind." Will that do for pericardial friction? No, because it is in the right axilla. Unless the heart is over on the right we cannot have pericardial friction there, so I do not think it is pericardial friction. I think it is a pleural friction.

If she had cirrhosis the disappearance of the edema and ascites would be queer. A patient with cirrhosis who is put to bed does not ordinarily begin to get better and have less edema and less ascites.

None of these facts about the tap fluid is of any value except the gravity. If we get a gravity of 1.019 or more in ascitic fluid it is either tuberculosis or malignant disease in the great majority of cases. If we get 1.010 or 1.005 it is pretty sure to be cardiac or renal dropsy and not tuberculosis or malignant disease. This is halfway between the two, but I should think is low enough to be against tuberculosis or malignant disease.

We have five causes of fluid in the abdomen: heart, kidney, liver, peritoneal tuberculosis, and cancer. The first three give low gravity fluid, the last two give high gravity fluid. It is worth while to take the gravity and that is all it is worth while doing with a tap fluid in the abdomen in the vast majority of cases.

They are trying for the spleen because if she had cirrhosis of the liver she would have a big spleen.

If the apex beat really is fixed, if it will not move when the patient is turned on the left side, that is important evidence of pericardial adhesions, but it is hard to be sure of without X-ray. That is the only really important evidence about chronic pericarditis.

We still do not know what operation was done. My guess is that it was this operation on the



pericardium, because they would not talk about the risk of a Talma operation. That is very little risk. I am going to say that this pericardial operation was done. I think they are going to find chronic pericarditis. I think that is the best guess on the facts before us.

#### OPERATION

Under ether a five-inch crescentic incision was made beginning at the inner margin of the fifth costal cartilage and extending to about the mid-axillary line, the convexity downward. About three inches was removed from the fourth, fifth and sixth ribs. As the sixth rib was being dissected away a slight nick was made in the pleura through which the air rushed in and out with respiration. The ribs having been removed, the pleural opening was enlarged. At only one point, and that well toward the back of the heart and down toward the apex, was there any adhesion to be felt. It was then decided to open the pericardium. Everywhere the heart muscle was adherent to it, the adhesions resembling areolar tissue. So dense and numerous were the adhesions that it was thought best not to attempt to separate them. The pericardium was then sutured with continuous catgut, the pleura with the same, and the skin with silk worm gut. During the manipulation on the heart its rate increased twelve beats. When the pleura was opened there was an appreciable change in the patient's breathing. At all times during the operation her condition was good. She was sent to the ward in fair condition.

#### FURTHER DISCUSSION

They confirm the diagnosis.

This is a much pleasanter state of things to have happen in the hospital than under one's private care outside. It would be pretty difficult to explain what was done here with strict adherence to the truth. I do not see that the operation helped the patient. I think this is one of the cases that convinced us we would better not do that operation any more. I don't think anybody now does it.

#### DIFFERENTIAL DIAGNOSIS

She died, I suppose, of pyopneumothorax or hydropneumothorax, left-sided, due to the operation. She also has, I believe, a hypertrophied and dilated heart, with adherent pericardium, a congested liver which may be somewhat cirrhotic, and fluid in all the serous cavities. The urine has been normal, so the kidneys ought to be all right except for passive congestion.

What about the valves of the heart? We had this systolic murmur, later we had a presystolic thrill with no murmur heard. Both can go with pericarditis without any valve lesion. I think it is possible that she did not have

any valve lesion. It is perfectly possible that she did, and on the evidence before us I do not see anything that enables us to decide.

I think there will be, then, chronic adhesive pericarditis, hypertrophy and dilatation of the heart, probably no valve lesion. She is too young for arteriosclerosis I should think. There should be hydropneumothorax or pyopneumothorax, left, ascites, passive congestion, and I think some change in the liver with an increase of interstitial tissue approaching cirrhosis. If so the spleen should also be enlarged.

A PHYSICIAN: For three months before she entered the hospital she vomited a great deal. She was not having ascites at that time.

DR. CABOT: I think she was. I think the ascites accounts for that, together with passive congestion of the stomach.

A PHYSICIAN: Would you consider a diagnosis of hemopneumothorax?

DR. CABOT: Possibly, yes. But they drained it once, and I do not know why it should go on bleeding.

#### CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Adhesive pericarditis.  
Cardiac exhaustion.

#### DR. RICHARD C. CABOT'S DIAGNOSIS

Chronic adhesive pericarditis.  
Hypertrophy and dilatation of the heart.  
Hydropneumothorax or pyopneumothorax.  
Chronic passive congestion.  
Cirrhosis of the liver?

#### ANATOMIC DIAGNOSIS

Fibrous endocarditis of the mitral valve. (Mitral stenosis.)  
Chronic adhesive pericarditis.  
Hydrothorax, double, with compression atelectasis of the lungs.  
Operation wounds, cardiolysis.

DR. MALLORY: The necropsy record in this case is incomplete because we were permitted to make an examination only through the operation wound, and only of the chest contents.

A completely adherent pericardium was found, and evidently nothing had been accomplished at operation towards freeing it. The pleural cavities were free from adhesions, but the left cavity was almost completely filled with slightly blood-tinged fluid, the right cavity about half filled. There is no record of air having been found in the cavities, although in view of the history it seems very probable that it was present.

We were unable to examine the abdominal organs, so I cannot say anything about the liver.

The mitral valve did show very marked stenosis, barely admitting one finger instead of the normal three. The impression, although the

heart could not be removed from the body to verify it by weight, was that it was not very much enlarged.

DR. CABOT: I am sorry they could not go down through the diaphragm to examine the liver. We never shall know whether that liver showed cirrhosis or not.

A PHYSICIAN: Can there be a thrill without stenosis?

DR. CABOT: No, not so far as I know. But they did not record any murmur. That is why I did not feel solid in saying stenosis, because if there is a thrill we always have a murmur. I was skeptical that they did not feel that thrill, but I guess now they did.

#### CASE 13282

#### A CASE OF RECTAL CARCINOMA

##### SURGICAL DEPARTMENT

A Nova Scotian carpenter thirty-four years old entered October 23 complaining of "a growth in the back passage."

Six months before admission for a week he had diarrhea, seven or eight formed stools daily. Since that time his bowels had been constipated, going two or three days without a movement and then requiring laxatives. For six months there had been a discharge from the anus. He had had no formed stools for some time. Three months before admission he began to have tenesmus which was constant until two weeks before admission, when it stopped. Two months before admission he consulted a physician and was treated for piles without relief. A month before admission and two or three times later he noticed a small amount of blood in his stools. He had lost ten pounds in the past six months. Usually, however, he lost five or six pounds during the summer, and he believed the rest of the loss due to his diet of soups and milk for the past two months. During the past two weeks, since he had stopped working and begun to eat normally again, he had gained three pounds.

At a visit to the Out-Patient Department October 13, ten days before admission, he complained of "a growth in the back passage" of three months' duration and of frequent impulse to defecate. He had no actual pain on defecation, but a burning sensation.

His family history is not significant.

His past history is negative except for gonorrhea ten years before admission and a small round smooth ball which for the past twenty years had protruded through the anus with each defecation, requiring to be pushed back and leaving a slight blood stain. A year before admission this mass ceased to appear.

Clinical examination showed a well nourished man. Occasional moles on the back. Throat slightly injected. Heart normal except for a first sound of poor quality. Increased tympany

over the colon. Three or four hard hemorrhoids an inch inside the anus. Above these, about two inches from the anus, was a hard constricting mass causing stenosis of the rectum. The lumen did not quite admit one finger.

Urine normal, 10,000 leucocytes, 84 per cent. polynuclears, hemoglobin 80 per cent., 4,100,000 reds, platelets reduced.

Temperature and respirations normal. Pulse 76 to 112.

Operation was planned, but the patient refused it. October 27 he was discharged against advice.

After leaving the hospital he did not attempt to work again. He consulted several physicians, two of whom treated him for piles. He felt well, but was very nervous and worried. For a few months preceding his second admission he had pain when sitting down, not at other times, and had no control of the anal sphincter, especially after he had taken cathartics. For this reason he gave up drugs and used enemas once a week. In January the skin around his anus became involved and he noticed a protrusion from the anus. For three months he had been unable to sit down at all. Several times he noticed blood in his stools. His bowels continued to be constipated. He had difficulty in giving himself an enema the last time he attempted it, a week before admission. He was troubled with gas and rumbling in the lower abdomen. He had lost no weight.

Clinical examination showed a thin man with a grayish pallor, especially about the lips. A few small shotty glands in both inguinal regions, probably not abnormal. A small hard irregular nodule measuring 1 centimeter fastened to the skin over the left posterior axillary fold. Abdomen held tight so that examination was difficult. Rectal examination showed a hard ulcerative condition of the anal mucosa extending out and posterior from the anus, which was now just a slit in granular tissue through which a greenish liquid feces escaped. The mucosa was hard. Touch caused so much pain that full examination was impossible, but the condition seemed to extend as high as an inch and a half to two inches from the outside.

Before operation amount of urine not recorded, urine cloudy at one of three examinations, specific gravity 1.020, rare leucocytes. Blood not recorded before operation. Wassermann strongly positive.

May 3 operation was done. The patient made an excellent recovery from anesthesia, but the night of May 4 began to have gas pains and moderate distension. May 9 the temperature was 101.2°, May 10 103.6°. The wound was becoming septic. May 11 the temperature reached normal but the patient still looked septic. May 12 the temperature was again up to 102°. It continued to swing between 99.1° to 102.5°. A blood culture showed streptococcus hemolyticus in one flask. There was practically no peristaltic activity. He was

given continuous gastric lavage. There was apparently high obstruction. The fluid returned with very little color, occasionally some bile, otherwise nothing. The general condition became worse. The pulse was 158 May 11, 160 May 12 and very poor. May 13 he was much worse. The pulse was down to 120. There was a little abdominal distension. May 14 the pulse was 170, the temperature 105.5°, the respirations 40. That night he died.

## DISCUSSION

BY EDWARD L. YOUNG, JR., M.D.

The interest in a case of this sort is not in diagnosis, because this story spells carcinoma of the rectum all too plainly. There are a few diagnoses that I think should be taught in the medical schools as requiring not only positive findings but also demanding exclusion of other conditions, and hemorrhoids is one of them. Every carcinoma of the rectum that we discuss here has the same story, "the patient was treated for piles." The unfortunate part is that the patient with carcinoma of the rectum may have piles either as an accompaniment or as a direct result of the disturbed blood supply due to the growth. The recognition of the early symptoms of cancer of the rectum and a more frequent use of a careful digital and proctoscopic examination would send a great many cases of rectal neoplasm to the surgeon at a stage when some hope could be offered.

DR. CABOT: What are the points here against syphilitic stricture?

DR. YOUNG: Syphilitic stricture above the anus is a very rare condition. Any stricture is the result of contraction from a scar which came from a previous ulceration. When it has reached the stage of stricture it loses the characteristics of the disease causing the original ulceration. Syphilitic ulceration of the mucous membrane above the anus is an extremely rare condition and as a result stricture from that would likewise be rare. In consultations with Dr. Lloyd, Chief of the South Medical Department, I have found he feels that the diagnosis of syphilitic stricture of the rectum is to be made very seldom. Here, of course, the examination describes a proliferative process and not a cicatricial contraction. One thing of interest here is the smooth round ball which the patient said he had had for twenty years. That may have been a hemorrhoidal tab or it may more probably have been a pedunculated polyp. It was not obvious on their present examination, and it may actually have become malignant and have been the cause of the present trouble.

MISS PAINTER: They thought it was a polyp.

DR. CABOT: Suppose we did not make this mistake which you have called our attention to so many times, the mistake of assuming that things are piles when they are cancer; have we

any good reason to suppose that early operation on cancer of the rectum is going to give strikingly better results than those we get now?

DR. YOUNG: This is one of the types of malignancy where the opinion of the surgical men as to treatment has been crystallizing within the past few years and it is now no longer the hopeless proposition that it was only a short time ago; but the hope of cure lies in a complete abdominoperineal operation with a permanent colostomy done as early in the disease as possible. Operations of minor severity may carry a slighter mortality, but they likewise have a poorer chance of giving permanent cure. I cannot quote exact figures, but I do know that in the hands of the best operators the mortality has been reduced to a reasonable figure and the percentage of cures is steadily rising. I believe that one large series of cases claims 34 per cent. of cures. In other words the general acceptance of a really radical operation gives a very good chance of cure. Without operation it is generally a very painful death. Radium may occasionally prolong life but does not do much toward alleviating suffering, at least with the technique in use up to the present.

The old feeling which a great many patients had, and which I think was held by a great many doctors, that it was better to die than live with a colostomy, has gone by. One patient that I know of, for example, was traveling all through Europe last summer in perfect comfort, and no one except the daughter who was with her knew that she had a colostomy.

Since cancer of the rectum stands fifth or sixth in order of frequency, anything that can be done in the line of prevention is worth carrying out. Ewing in his recent paper on the prevention of cancer says, "It is not unreasonable to assume that chronic constipation often adds the decisive factor in producing rectal cancer." In other words, more attention should be paid to the attaining of normal bowel action by means of diet, habits, oil, etc., with the avoidance of irritating laxatives.

When this patient came for treatment there was obviously nothing to do but a palliative colostomy in the attempt to give him greater comfort.

## PRE-OPERATIVE DIAGNOSIS

Carcinoma of the rectum.

## OPERATION

Gas-ether. Through a left paramedian incision the abdomen was opened without incident. Exploration of the pelvis revealed a large adherent growth in the upper rectum which had extended above the peritoneal floor involving the cul-de-sac, and metastases were visible between the bladder and the rectum. The colon behind the growth was filled with solid fecal material. A colostomy was performed.

Rectal examination under ether disclosed definite carcinoma of the anal canal. Above this was an area of smooth rectum for about an inch and a half on all sides and at the upper end of this area was a constriction of the gut by what was apparently disease. The surgeon's impression was that the intervening area was not malignant.

#### ADDITIONAL NOTES FROM THE HISTORY

May 5 the colostomy was opened with the cautery. A considerable amount of fecal matter was extracted manually. Copious irrigation produced very little. Four ounces of oil was left in the bowel. May 7 the colostomy still did not work without enemas. May 8 the bowel was sectioned. Considerable bleeding was encountered. May 9 the colostomy was working well. The following day considerable pus was squeezed out around the lower loop. The pus cavity involved the entire lower part of the wound and had dissected subcutaneously probably three inches to the left. May 11 the bowels moved once. The next day the colostomy was not working at all. Irrigations were given twice a day without gas or fecal result. The sinus around the lower loop of the colostomy now clearly communicated with some part of the peritoneal cavity. May 13 the patient took 326 ounces by mouth. 312 ounces returned to the bottle.

#### FURTHER DISCUSSION

Of course he has had a chronic back pressure in the colon for a long time. There have been several cases here where following operation there has been a peritonitis resulting from the gradual ulceration through the intestine of hard impacted feces in the large bowel. This might well produce the same situation. There may be nothing but the peritonitis. There may be such a spread of the disease that that alone has made an obstruction, and there may be the ulceration of the disease through from the bowel. Or there may be a postoperative band of adhesions which made trouble by causing obstruction.

#### CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Carcinoma of the rectum.

#### DR. EDWARD L. YOUNG'S DIAGNOSIS

Carcinoma of the rectum.  
General peritonitis.

#### ANATOMIC DIAGNOSES

Colloid carcinoma of the rectum.  
General peritonitis.  
Operative wound, colostomy.

DR. MALLORY: At the time this patient reached our laboratory he had of course the wound of his colostomy, which showed suppura-

tion about it, and the colon had been divided. The lower portion of it had partially slipped back into the abdomen, the sutures having all ulcerated out in the inflammatory process in the abdominal wall. There was a widespread general peritonitis, the entire cavity being filled with thick green pus. The intestine showed tremendous dilatation from the duodenum down to a point about four feet from the ileocecal valve. Here a portion ten centimeters in length was more deeply congested than the remainder, but no definite obstruction could be made out. From that point on the intestine was collapsed.

As to the growth in the rectum itself, there was definite cancerous tissue about the anus. Then for a length of about four centimeters, I should say, the mucosa was normal, but there was cancerous infiltration of the wall. Above that point was a very large annular mass of tumor tissue completely encircling the lumen, forming a mass as big as a child's head. The growth had encircled the prostate and also the ureters, but had caused no constriction of the ureters. Their lumina were of normal size, and the pelves and kidneys were negative. The heart, lungs, and other organs were all negative.

DR. YOUNG: What about syphilitic stricture of the rectum from the pathological point of view?

DR. MALLORY: I have never seen one and I do not like to say anything about it.

#### YELLOW FEVER CRIPPLE REWARDED

##### LIVING LABORATORY FOR DR. REED GIVEN HOME

New York, June 30 (AP)—Crippled from the ravages of yellow fever, when he served as a living laboratory in 1900 for Dr. Walter Reed, who was seeking to trace the origin of the disease, John R. Kissinger, former army private, received a reward for his heroism today.

Through a committee appointed by the American Association for Medical Progress, Kissinger has been deeded a home in Huntington, Ind., which will relieve him from the poverty in which his voluntary illness has left him.

While serving as a private in the army in Cuba, Kissinger allowed Dr. Reed to experiment with him to the end of checking yellow fever, which had gripped Central and South America. Kissinger was isolated and Dr. Reed caused him to be bitten by an infected aedes mosquito.

Kissinger contracted yellow fever and lived through its ravages to prove the theory that the mosquito was the transmitting agent. The ordeal left him a cripple.—*Boston Herald*.

#### NEW BEDFORD MILK DEALERS WARNED

##### CANNOT BUY PRODUCT FROM UNINSPECTED DAIRIES

##### (Special Dispatch to *The Herald*)

New Bedford, June 30—New Bedford milk dealers whose supply is expected to be cut down greatly when a majority of the farmers and producers throughout the section inaugurate their retail delivery system tomorrow morning were called into conference by the Board of Health tonight and warned that they must not go out of the city to purchase milk from farmers whose dairies have not been inspected by the local health authorities.



## THE BOSTON Medical and Surgical Journal

Established in 1888

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### WHAT CAN BE DONE TO SECURE MORE DEFINITE CO-OPERATION WITH THE PARENT SOCIETY BY THE DISTRICTS AND INDIVIDUAL MEMBERS?

THE regular year's program in Medical Societies is usually brought to an end with the Annual Meetings and in anticipation of vacations the officers and members of the district societies are often inclined to postpone any constructive program until just before the autumn meetings.

The component societies to some extent at least seem to feel that the only definite responsibility is centered in the work of the district organization. While it is true that district activities are of great importance in keeping members interested in the questions of the day and building up a strong coöperative organization, much effort is necessary to bring about the welding of the component parts of the parent body into a strong state organization.

The idea has been expressed at times, that the State Society has little desire for any great display of interest in its affairs on the part of the smaller groups, but here in Massachusetts the underlying purpose of its officers has been to demonstrate the most democratic spirit possible

and create a feeling of responsibility on the part of every individual member. Committees want the viewpoint of those at a distance in helping them in their deliberations and the annual reports should be read carefully as found in the Proceedings of the Council and of the Society and if suggestions are forthcoming they will be given careful consideration. If policies are not understood or approved, information to that effect could be discussed in district meetings and the action of such bodies would be official opinions which would be influential in changes for the benefit of all concerned.

It would be of great importance in formulating constructive criticisms for any student of State problems to learn of work done in other states to the end that our own may be kept in the front rank.

Our delegates to the National Association would be inspired if more members of the Society which they represent would express opinions concerning national policies.

If the committee on public health, the committee on legislation, or the committee on the Annual Meeting are in a position to deal with some details which occur to our members, these suggestions should be put into form and presented.

Our members may not know generally that several states have larger annual dues than ours, and are spending more money on public health programs, or publicity for example, and if our members are disposed to raise more money for society purposes, that is a subject for discussion. A very pertinent subject is the annual meeting. While it is true that the expense of this year's meeting was larger than has been customary, it is certainly true that a dollar's worth of entertainment was given for every dollar expended, but there may be details which are fit subjects for discussions, and careful thought may enable members to express themselves through the columns of the JOURNAL or through their representative councillors.

These thoughts are expressed with the wish that individual members may be led to feel that the Society is their Society and it has a responsibility to each one. This responsibility can be best met if committees and officers are given information of the wishes of the members.

### THIS WEEK'S ISSUE

CONTAINS articles by the following authors:

HURXTHAL, LEWIS M., M.D. Harvard Medical School 1923; Resident in Medicine, Massachusetts General Hospital 1925-26; Research Fellow, Harvard Medical School 1926; now in charge of the Department of Medicine at the Lahey Clinic. His subject is "Clinical Observations on Subacute Bacterial Endocarditis." Page 41. Address: 605 Commonwealth Avenue, Boston, Mass.



MORRISON, HYMAN, A.B.; M.D. Harvard Medical School 1908. Assistant in Medicine, Harvard Medical School; Physician to Out-Patients Massachusetts General Hospital; Visiting Physician, Beth Israel Hospital. His subject is "A Study of the Incidence of Subacute Bacterial Endocarditis at the Massachusetts General Hospital." Page 46. Address: 483 Beacon Street, Boston, Mass.

BALDWIN, EDWARD R., M.A.; M.D. Yale Medical School 1890; Director Trudeau Foundation, Saranac Lake, New York. His subject is "Tuberculous Infection with Especial Consideration of Its Quantity, Virulence and Frequency." Page 49. Address: Saranac Lake, New York.

DALAND, E. M., A.B.; M.D. Harvard Medical School 1918; F.A.C.S.; Surgeon Collis P. Huntington Hospital; Chief of Staff Pondville State Hospital; Surgeon to Out-Patients Massachusetts General Hospital. His subject is "Cancer of the Breast." Page 57. Address: 483 Beacon Street, Boston, Mass.

O'HARA, DWIGHT, B.S.; M.D. Harvard Medical School 1919; Visiting Physician, Waltham Hospital; Junior Visiting Physician, Boston City Hospital; Lecturer in Therapeutics, Boston University School of Medicine. His subject is "The Heritage of Middlesex South." Page 60. Address: 751 Main Street, Waltham, Mass.

### MISCELLANY

#### THE RESIGNATION OF DR. JOHN M. BIRNIE FROM THE BOARD OF REGISTRATION IN MEDICINE

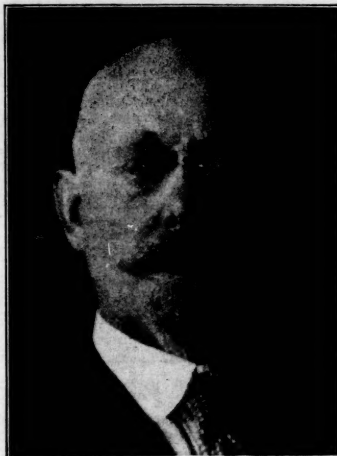
THE duties imposed on Dr. John M. Birnie by the election to the Presidency of the Massachusetts Medical Society have led him to feel that he must relinquish the position of Chairman of the Board of Registration in Medicine and the Governor has been asked to accept his resignation as a member of that body.

Dr. Birnie has represented the western section of the state on that Board and has been a faithful servant of the Commonwealth in meeting the arduous and complicated work which is required of a board dealing with the registration of physicians and the many complementary problems.

#### HERBERT F. TWITCHELL, M.D., PRESIDENT OF THE MAINE MEDICAL ASSOCIATION

At the Annual Meeting of the Maine Medical Association held in Portland, June 13, 14, and 15, 1927, Dr. Herbert F. Twitchell was elected to the Presidency of that organization. He was born in Bethel, Maine, November 16, 1859. His early education was acquired at Gould's Acad-

emy and he received the degree of M.D. from the Medical School of Maine in 1883. He served as intern at Maine General Hospital 1883-1884, subsequently practicing in Freeport, Maine, eight years, moving to Portland, Maine, in 1892 where he has since been in active practice. He was appointed adjunct surgeon to the Maine General Hospital in 1895 and advanced to Se-



HERBERT F. TWITCHELL, M.D.

nior Surgeon in 1901, and at present is consulting surgeon to the Maine General Hospital, the Maine Eye and Ear Infirmary, the State Street Hospital of Portland and the Webber Hospital of Biddeford. He is a member of Portland Medical Association, the Cumberland County Medical Association, the American Medical Association, and Fellow of the American College of Surgeons. He was President of Cumberland County Association in 1915.

#### THE ILLINOIS MEDICAL JOURNAL AND THE PROPOSED AMENDMENT TO THE VOLSTEAD ACT

In the last part of an editorial in the May, 1927, issue of the *Illinois Medical Journal*, the writer asks Dr. Arthur Dean Bevan to support the proposed amendment to the code of ethics of the American Medical Association which reads as follows:

*Resolved*, That Section 7, Chapter 11, of the Principles of Medical Ethics of the American Medical Association, shall be amended by inserting after "profession," the fourth word in the fourth line, the following:

All questions of debatable medical custom, practice or conduct, and all other questions, the discussion of which may be derogatory to a licensed practitioner

of medicine, or to the medical profession in general, shall be considered in official and duly appointed committees on ethical relationships, or shall be referred to the Judicial Council of the American Medical Association.

Making Section 7 of Chapter 11 to read as follows:

#### SAFEGUARDING THE PROFESSION

SECTION 7—Physicians should expose without fear or favor before the proper medical or legal tribunals, corrupt or dishonest conduct of members of the profession. All questions of debatable medical custom, practice or conduct, and all other questions, the discussion of which may be derogatory to a licensed practitioner of medicine, or to the medical profession in general, shall be considered in official and duly appointed committees on ethical relationships, or shall be referred to the Judicial Council of the American Medical Association. Every physician should aid in safeguarding the profession against the admission to its ranks of those who are unfit or unqualified because deficient either in moral character or education.

THE MCLEAN COUNTY MEDICAL SOCIETY.

Signed by:

Albert W. Meyer, *President*.  
Ralph P. Peairs, *Secretary*.

This request in the editorial follows a severe verbal castigation of Dr. Bevan for his statement that ninety-nine per cent of the prescriptions for whisky are bootlegging prescriptions.

### RECENT DEATH

**BEST**—DR. ENOCH GEORGE BEST, 76 years old, practicing physician of Greenfield for 25 years, died July 4, 1927, in Franklin County Hospital, Greenfield.

He was a native of Norwich, Conn., and in early life lived in Holyoke. He attended Yale Medical School and was graduated from New York University Medical College in 1882, and settled in Turner's Falls, Mass., in the following year. In 1901 he moved to Greenfield. He was a Fellow of the Massachusetts Medical Society and of the American Medical Association. Dr. Best was supervising censor of the Franklin District Medical Society from 1890 to 1894.

He devoted much time to work in the Masonic order over a period of 50 years, and in Greenfield was past T. I. M. of Titus Strong Council; past commander of Connecticut Valley Commandery and was past grand king of the Grand Chapter of Royal Arch Masons and past grand scribe of the Grand Council of Massachusetts.

Dr. Best married Miss Harriet Alston of Unionville, Conn., in 1882, and besides his wife leaves a sister, Miss Mary Best, and brother, Edward Best, both of Holyoke.

### CORRESPONDENCE

#### CANCER DAY IN LYNN

On June 16 Lynn held a "cancer day," which was made memorable by a visit from Dr. Joseph Colt Bloodgood of Baltimore, who attended the cancer clinic in the morning at Lynn Hospital, where he demonstrated eighteen cases for the benefit of the assembled physicians. A luncheon sponsored by the allied council of the Lynn service clubs was held at noon in Pythian Hall with an attendance of over three hundred laymen. Brief remarks were made by Dr. George H. Bigelow, Commissioner of Public Health for the Commonwealth, and by Dr. William T. Hopkins, chairman of the Lynn Cancer Committee, and an address was delivered by Dr. Bloodgood. In

the evening the Lynn Medical Fraternity held a special meeting and dinner in honor of Dr. Bloodgood at the New Ocean House, Swampscott, in which the members of the Essex South District Society were invited to participate. At the close of the dinner Dr. Bloodgood spoke on cancer, with lantern slide illustrations.

Attendance, 65. Adjourned 10:30 P. M.

WM. T. HOPKINS, *Reporter*.

### NEWS ITEM

**QUACKERY ADVERTISEMENTS**—It is reported that the two leading newspapers in Minneapolis do not accept advertisements of quacks. This is practically true also of the *New York Times*. It is regrettable that the large daily papers in Massachusetts cannot feel that advertisements setting forth unsound claims are not worthy of a place in their columns.

We confidently believe that there will be a time when the advertisements of quacks will be prevented by legal enactment.

### CONNECTICUT DEPARTMENT OF HEALTH

#### MORBIDITY REPORT FOR THE WEEK ENDING JULY 2, 1927

Diphtheria	31	Chickenpox	33
Last week	34	German measles	3
Diphtheria bacilli carriers	9	Influenza	2
Scarlet fever	23	Malaria	2
Last week	48	Mumps	20
Measles	47	Pneumonia, lobar	10
Last week	68	Septic sore throat	2
Whooping cough	12	Tuberculosis, pulmo-	
Last week	16	nary	29
Typhoid fever	2	Tuberculosis, other	
Last week	0	forms	2
Bronchopneumonia	10	Gonorrhea	16
Cerebrospinal meningitis	1	Syphilis	36

### NOTICES

#### REMOVAL OF DR. GEORGE HIPKISS

DR. GEORGE HIPKISS has moved from 16 Euston Street, Brookline, to 541 Main Street, Stoneham.

#### REQUEST FOR NAMES OF LOCAL MEDICAL SOCIETIES

We have received a request for the names of local Medical Societies not officially connected with the Massachusetts Medical Society. If doctors will send in the names of societies of which they have information and the list of officers we will be obliged.

### REPORTS AND NOTICES OF MEETINGS

#### WORCESTER NORTH DISTRICT MEDICAL SOCIETY FITCHBURG

FELLOWS of the Society and their Ladies were invited to meet at the Gardner State Colony Tuesday, July 12th, 1927.

Dinner was served at 1 P. M.

Scientific program was by Dr. C. E. Thompson and Staff followed by inspection of new building and baseball game.

A. F. LOWELL, *Pres.* C. H. JENNINGS, *Sec'y.*